THE MADRAS JOURNAL OF LITERATURE AND SCIENCE,

PUBLISHED UNDER THE AUSPICES

OF THE

MADRAS LITERARY SOCIETY

AND

AUXILIARY OF THE ROYAL ASIATIC SOCIETY.

VOL. V.

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EDITED BY

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MADRAS MEDICAL ESTABLISHMENT,

SECRETARY TO THE ASIATIC DEPARTMENT OF THE SOCIETY.

VOL. V.VI.

January—June 1837.

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MADRAS:

PRINTED AT THE ATHENÆUM PRESS,

BY J. B. PHAROAH, AND PUBLISHED BY J. P. BANTLEMAN,

AT THE COLLEGE.

MDCCCXXXVII.

I. Albida.

MADRAS JOURNAL

OF

LITERATURE AND SCIENCE.

No. 14.—*January*, 1837.

I.—*Contributions to Indian Botany*, No. I.—*By* Robert Wight, M. D., F. L. S., &c. &c. *Member of the Imp. Acad. Naturæ Curiosorum. Surgeon on the Madras Establishment.*

On the Genus Impatiens.

The Genus *Impatiens*, from occupying a prominent place in the Indian Flora, as well as from being in a great measure confined to this country justly claims for itself, in a proportionate degree, the attention of the Indian Botanist.

On this account, I have selected it for the first of a series of papers, to be continued from time to time, under the above title, in which it is my intention to give descriptions and illustrations of such new, or otherwise interesting plants, as I may chance to obtain, whether collected by myself, or communicated by friends, desirous of lending their assistance to the advancement of a highly interesting and useful science. Its selection, for the commencement of the series, is rendered still more appropriate, by the circumstance of its extent, as well as the peculiarities of its structure, being nearly unknown, till within these few years.

Of this genus, now embracing nearly one hundred species, Linnæus only knew seven or eight; and most of these from indifferent figures. In 1805 when Persoon published his Synopsis, ten only were known; to these only six had been added in 1819, when Roemer and Schultes published the fourth volume of their *Systema Vegetabilium*, and one of the six "sine definitione." In 1824, Professor Decandolle published the first volume of his *Prodromus*, and extended the catalogue from sixteen to thirty-one, excluding the undefined one, thus doubling the former number: of these, twenty-four are Indian, nearly all the new ones being derived from Dr. Wallich's Nepaul Collections. In 1830-31, Dr. Wallich

named in his list no fewer than forty-seven Indian species. Since that time Mr. Royle informs us, (*Illustrations* page 151) that his collection contains several not in Wallich's list, and Mr. Arnott writes me that he has recently described sixteen new ones from Ceylon. To these last, my excursions on the Courtallum and Shevagerry hills have added about as many more. Of the Courtallum ones, those only of which drawings were made, are introduced into this paper; not having, either specimens or sufficiently perfect notes, to enable me to define the rest. This defect I regret the less, as I expect to have yet many more to add to the list, and will avail myself of an opportunity of making them known, and I hope at the same time, to revise the whole of the peninsular portion of the genus.

As already observed, the peculiarities of the flower of the *Balsaminiæ*, were, till lately, as little known as the number of its species. Linnæus, and subsequently Schreber, in the *Genera Plantarum*, describes the flower of *Impatiens* as being composed of two small lateral sepals, five petals, and a nectary: the petals are said to be one above, two below, forming a lip, and an intermediate pair between these and the upper one, the nectary or spur between the lower pair; thus viewing each of the lateral two-lobed petals as two. Decandolle, following Jussieu, assigns to it two lateral sepals, and four petals–one above, one below, ending in a spur, and two interior, more petaloid ones, alternate with the other two: generally either cleft or furnished with some other appendage. In 1827, Professor Kunth published a memoir on the subject, in which he takes a different view from either of these, assigning to it five sepals and four petals, the fifth petal, required to make up the normal number, being absent from abortion. The following extract from Lindley's Introduction to the Natural System of Botany, will explain how he arrives at this conclusion: "The fact is, that the structure is usually this: the centre of the flower is occupied by an ovarium, surmounted by a stigma divided into five acute lobes. Around this stand five hypogynous stamens, placed in a single row at equal distances from each other. Hence the normal number of the parts of the flower should be five. The corolla, however, consists of two bifid petals placed right and left, with a wider space between their upper than lower edges. Upon comparing the position of these with the stamens, it appears that each occupies the place of three stamens, whence it is impossible to doubt, that they consist of two soldered together. On the other hand, the space between them, which answers to two stamens, is an equal proof of the abortion of the fifth petal. And this view of the structure is confirmed by the sepals. Thus on the outside of each pair of petals, at their base, is found a leaflet, the situation of which is opposite a stamen; and opposite the space left by the abortion of the fifth petal, is a large broad leaflet, made up by the union of two sepals. The position of the fifth

sepal, which is that which is spurred, is between two petals and opposite a stamen." It is only necessary to add, that the correctness of the deductions obtained from this most masterly analysis of the flower of the common Balsam, is now completely proved by the structure of the genus *Hydrocera*, the only other genus of the order, which enjoys the full compliment of parts, namely, five sepals, five petals, five stamens and five stigmas, with a truly five-celled fruit, not like *Impatiens* opening with elasticity.

I have thought it necessary to introduce this explanation of the structure of the flower of *Impatiens*, partly with the view of exhibiting an excellent example of botanical analysis, but principally, to enable such of my readers as may not have had an opportunity of becoming acquainted with it, more readily to accompany me, when perusing the following descriptions. I do not, however, intend to adopt the language which it points out as strictly correct, but shall continue to employ nearly the same terms as those used in my *Prodromus*, in which the two united petaloid sepals are called the posterior or upper sepal; the lower one, the spur, in all cases where that organ is so much developed, as to leave no evident foliaceous portion, as is the case in nearly all the following species. The united pairs of petals are considered single two-lobed ones, and the lobes indicated by the terms upper and lower. As it is from the relative sizes of these parts that the best specific marks are obtained, and as they will be found introduced into the character of each species, I have been thus particular in explaining the names under which they appear. So numerous, indeed, and at the same time so constant, are the variations in form, which these parts assume in different species, that, with the exception of those taken from the general habit of the plants, no other part need be mentioned in characterizing them. But as most of those now known, are taken up from dried specimens, in which it is always difficult, and often impossible, to make out the characters of the flower, I have added all those procurable from other parts of the plant, as the only inconvenience attendant on their introduction is, the length to which the definitions are thereby extended; a fault, which is more than compensated by the facility of correctly discriminating species in such a large and daily increasing genus; and, by affording those who may possess dried specimens, the means of referring them to their proper species.

It is a curious, and to me an inexplicable fact, that a genus so strikingly Indian, and associating such a host of species, should have been so little known to Roxburgh. He only describes three in his Flora, though I am sure I speak within bounds, when I assert that the countries, whence he derived the materials for his work, will be found to present an assemblage of not fewer than one hundred species. It is no doubt an eminently alpine genus, delighting in a cool and moist climate;

hence it is unknown on the plains of Coromandel, though not unfrequent in Mysore, but, so far as I have seen, only abounding, in the peninsula, on the higher hills participating in the western monsoon, which enjoy, during the hot months, a moderate range of temperature, with a very humid atmosphere. Some, how many is not yet known, are found during the monsoon on the Malabar coast, but little elevated above the level of the sea, but, except in Tanjore, I have not seen one of the order on the plains eastward of the ghauts, beyond the influence of that monsoon: and the only one found there, is the *Hydrocera triflora*, which grows, but is not common, in its ditches and swampy grounds, during the cool season, and is the only place where I have yet seen it.

This peculiarity of distribution may account for his not having met with peninsular species, as he was but little in the southern provinces, and perhaps they are not found in the eastern range of the northern ghauts: but, twenty-two of the forty-seven species named by Wallich, are from Silhet, Pundooa and Nepaul, from all of which places Roxburgh procured plants, and one of the three he describes is from Silhet. A moist climate and moderate temperature are the circumstances most favourable, if not indispensable, to their production; hence we find twenty-two, of the remaining twenty-five species named by Wallich, natives of the peninsula, but confined to the ghauts and Mysore where these contingencies meet. This fact was first noticed by Mr. Royle, who, after remarking the nearly equal division of the forty-seven species between the frontier mountains of Bengal and the peninsula, adds, "a singular equality of numbers, seeing that we have hitherto found peninsular and South of India genera confined to the base of the mountains, and if found existing on them, generally only as single species; but here we have them in equal numbers, some of them extending to an elevation of seven thousand feet.

"This anomaly can only be explained, and a stronger fact cannot be adduced in its confirmation, than that the moisture and moderate temperature of the rainy season in the hills (for it is at this season only that they are found) is as favourable to their growth as the heat and moisture of the peninsula. I have never met with any in the plains of India; but have heard from travellers that they are abundant in Central India, whence we may expect some new species, as well as from the Neilgherries."

The facts which I have mentioned regarding the distribution of the peninsular species, go to prove, that heat and moisture are not the circumstances most favourable to their production here, but moisture combined with a moderate but equal temperature. At Courtallum for example, whence I have eleven or twelve species, they most abound in shady places on the tops of the hills, with a mean temperature during the

season of their greatest perfection, not exceeding 70°, if so much. At Shevageery, about fifty miles north of Courtallum, I found five, out of seven species, on the highest tops of the mountains; none of the five under 4,000 feet, and three of them above 4,500 feet of elevation; the mean temperature, as deduced from twenty observations, continued through four days, at an elevation of 4,100 feet, being 65° of Fahrenheit's scale. The two found at a lower elevation, were both either growing in the gravelly beds of streams, or immediately on their banks; the temperature of which was ascertained to be 65°, while that of the air at noon was only about 75°, a temperature, I presume, but little above that in which they delight on the Bengal frontiers. There is one other point, respecting the effect of climate on plants of this genus, to which I wish to call attention, as it may ultimately prove useful to any one who may again attempt to subdivide it, and is, in the mean time, in a physiological point of view, exceedingly curious. It is, that most of the species from the colder regions of the Himalaya mountains, correspond with the European I. *noli tangere*, in the form and dehiscence of their capsule, that is, they split from the base, rolling the segments towards the apex, while those of the warmer regions split from the apex and roll their segments towards the base. This difference of habit between those of India proper and the Himalayan forms, is well worthy of notice, as it shows, that the affinity which exists between the flora of the latter and that of Europe, is stronger than between it and the Indian, and extends to even this most purely tropical genus.

The innate power which plants enjoy of selecting the soil and climate in different countries, however remote, most suitable to their perfect development, and which the preceding remarks have shown to be so eminently possessed by those of this order, may, when the subject has been more studied and is better understood, prove of immense benefit to the scientific cultivator.

Taking for an example the genus *Impatiens*, we may at once infer, that herbaceous plants growing where its species abounds, and arriving at maturity about the same time, may be transferred to any other locality, where they are equally prevalent. Thus the associates of I. *noli-tangere*, *insignis*, *racemosa* and *bicolor*, might be mutually interchanged; while the neighbours of I. *reticulata*, *puberula*, &c. might be made to change places with those of I. *fasciculata*, *grandis*, and many more, with every prospect of success. The limits to which this rule may be extended are as yet totally unknown, and cannot be estimated, until plants are studied not as insulated individuals, but in connexion with the soil, climate, aspect, exposure, &c. in which they are observed to arrive at the greatest perfection. This is a study which the scientific botanist pursues in its relations to the physiological peculiarities of plants, but to the cultivator, it becomes one of much deeper and more

engrossing interest, as the success or failure of vast speculations may depend on his acquaintance with, or ignorance of, the external agents which act on the objects of his culture—whether for their benefit or their injury.

Should any one doubt the correctness of this statement, I would refer him to the *too short*, but luminous paper of Mr. Piddington* on the analysis of soils suitable for cotton, tobacco, &c. where he will find most ample and irrefragable proofs of their truth—a paper, that, in my opinion, cannot be too extensively made known, and one, my ignorance of which, when I wrote my desultory remarks on the culture of cotton, published in No. 12 of the Madras Journal, I now greatly regret. The study of plants, in relation to the agents that either promote or impede the attainment of their greatest perfection, is necessarily a difficult and tedious one, from the diversified attainments which the enquirer must bring to his aid, and from the prolonged meteorological investigations which are indispensable to its completion; but it is one, which, there is every reason to believe, will much more than repay the cost.

SYNOPTICAL ARRANGEMENT OF SPECIES.

§ 1 *Leaves alternate, pedicels solitary or aggregate, one flowered.*
1. IMPATIENS *albida.*
2. „ *dasysperma.*
3. „ *floribunda.*

§ 2. *Leaves alternate, peduncles two flowered, upper sepals herbaceous (green).*
4. IMPATIENS *auriculata.*
5. „ *viridiflora.*

§ 3. *Leaves alternate, peduncles several flowered, upper sepals petaloid.*
6. IMPATIENS *umbellatta.*
7. „ *grandis.*
8. „ *cordata.*
9. „ *uncinata.*
10. „ *companulata.*
11. „ *viscida.*

§ 4. *Leaves alternate, flowers racemose.*
12. IMPATIENS *maculata.*

§ 5. *Leaves radical, scape racemose.*
13. IMPATIENS *modesta.*
14. „ *rivalis.*

§ 6. *Leaves opposite, pedicels one flowered.*
15. IMPATIENS *fasciculata.*
16. „ *rosmarinifolia.*

§ 7. *Leaves opposite or verticelled, pedicels several flowered.*
17. IMPATIENS *verticellata.*

* Reprinted in the last No. of this Journal.—ED.

I. Dasysperma. R.W.

der, about twice the length of the petals, straight. *Petals*, smaller than the upper sepal, the upper lobe much smaller than the lower. *Capsule* oblong, attenuated at both ends, glabrous.

Hab. Shevagherry hills, in dense forests, at an elevation of about 4,500 feet.

This is a large, very ramous, bushy plant, from four to six feet high, the larger branches naked, but the young terminal shoots bearing numerous, closely congested, rather small leaves, the largest rarely exceeding 2 or 2½ inches long in its whole length; by ¾ broad. Sometimes the petiole has only one pair of glands, but oftener more, and the bristles of the lower serratures of the leaves are often glandular. The peduncles are usually three together, and about the length of the adjoining half. The flowers are conspicuous on account of the large upper very petaloid sepal, nearly equaling in size both the petals, and the much greater size of the upper than the lower lobes of the petals. It is nearly allied to I. *arcuata*, but is readily distinguished by being every where glabrous, in place of all more or less clothed with pubescence as in that species. It is distinguished from I. *Balsaminia* by its glabrous capsules, and from *Leschenaultii* by its glandular petioles, and aggregated pedicels.

§ 2. *Leaves alternate, peduncles two flowered, upper sepals herbaceous (green).*

4.—IMPATIENS *auriculata*. (R. W.)

Herbaceous, procumbent, glabrous, rooting along the stem. *Leaves* congested on the ends of the shoots, petioled, alternate, broadly ovate, lanceolate, bristle serrated. *Peduncles* about the length of the petioles, two flowered. *Pedicels* erect, many times longer than the peduncle. *Flowers* large. *Sepals*, upper vaulted, crowned with a foliaceous crest; lateral ones very large, pendulous, obliquely ovate, acute; lower, conical, including the inferior half of the lower petals, and ending in a hooked spur. Upper lobes of the *petals* smaller, opposed to the superior dilated half of the lower. *Capsule* ovate, many seeded.

Hab. Courtallum on branches of trees, flowering in August and September.

This species differs so much in the general form of its flowers, and in the relative size of their parts, that I at first proposed separating it from the genus. The discovery of a second very nearly allied species, but agreeing better in these respects with the other members of the genus, renders such a step inadmissible. The specific name is in allusion to the side sepals hanging down on each side like dog's ears. The general appearance of the flower, from the mixture of colours which it presents, is very unusual. The upper sepal or helmet, which, it greatly resembles, both in form and situation, is bright green, the

I. Auriculata.

I. Umbellata.

lateral sepals and spur, deep scarlet, while the upper projecting portion of the petals is dark purple.

It grows on branches of trees, on the top of some hills, much exposed to rain and mists, in large tufts, covered with flowers, when I gathered it forming an object not less curious than beautiful. The distance and intricacy of the way to the station prevented my visiting it more than once, though rewarded with a very large collection of new plants, from having lost my way home, and being forced to spend the night as I best could in the jungles.

5. IMPATIENS *viridiflora.* (R. W.)

Herbaceous, erect, ramous. *Leaves* succulent, congested near the ends of the branches, petioled, ovate, lanceolate, acute, incurved bristle serrated, glabrous. *Peduncles* axillary, two, rarely one, flowered, longer than the petiol, and shorter than the pedicels, when two. *Sepals*, upper vaulted, and crowned with an erect, foliaceous crest; lateral ones subulate, reflexed. *Spur* conical, revolute at the point, twice the length of the thick fleshy petals. *Petals* unequally lobed, upper lobe concealed under the sepal. *Capsule* glabrous.

Hab. Shevagerry on the highest part of the hills, about four thousand five hundred feet of elevation, forming large masses on the branches of trees.

This differs from its congener, in the small size of its lateral sepals, somewhat in the position of its petals, in having all its sepals of a bright herbaceous green, and in its erect ramous tree like habit.

§ 3. *Leaves alternate, peduncles several flowered, upper sepals petaloid.*

6. IMPATIENS *umbellata.* (HEYNE.)

Herbaceous, erect, root tuberous. *Leaves* crowded towards the apex of the stem, broadly ovate, lanceolate, obtuse from crenated to incurved bristle serrated; above, sprinkled with short hairs, below, usually coloured glabrous. *Peduncles* shorter than the leaves, bearing 4-6 rather large pedicelled flowers. *Sepals*, upper orbicular, nearly equaling the petals, not furnished with a herbaceous point. *Spur* slender, tapering, curved upwards, longer than the petals : lobes of the *petals* about equal, lower one broader, cuniate. *Capsule* glabrous, many seeded; *seeds* echinate.

Hab. Courtallum, in moist soil in alpine jungles, at a considerable elevation.

As this plant has hitherto been described from dried specimens only, the accompanying figure may serve to make it better known. I have somewhat extended the character, which is the more necessary, now that so many species have recently been added, and are daily adding to

the genus. The leaves are described as "usually coloured below;" they are generally, but not invariably, tinged with a dark brownish purple on the under surface. I have as yet only met with this plant at Courtallum, which is probably Heyne's station, though not mentioned.

7. IMPATIENS *grandis. (Heyne, Wallich,* in *Roxb. Fl. Ind. (Ed. Wall.)* 2 p. 464. *Wight and Arnott Prodrom. Fl. Pen. Ind. Or.)*
Hab. Courtallum—Shevagerry, in moist woods.

This magnificent species being as yet known to us through descriptions of dried specimens only, the accompanying figure, and following notes taken from growing plants will serve to make us better acquainted with it.

Erect, 4 to 8 feet high, much branched, herbaceous, except near the root, glabrous; *branches* terate, marked with numerous prominent scars of fallen leaves. *Leaves* congested near the extremities of the branches, long petoiled, prominently veined, glabrous, ovate lanceolate, tapering downwards, till lost in the petiole, acute or prolonged into a short sharp pointed acumen, acutely incurved bristle serrated. *Petoiles* furnished near the apex with two pedicelled glands. *Peduncles* axillary, longer than the petoiles, erect, bearing 3-4 large, long pedicelled, pale rose coloured flowers. *Pedicels* nearly the length of the peduncle, with a single bractea at the base of each. Upper *sepals* large, emarginate, reflected; under, funnel shaped with a tapering, conical *spur,* from 2 to 3 inches long, slightly curved towards the point. *Petals* about half the length of the spur, unequally lobed a little longer than the upper, very petaloid, sepal, and with it variegated with deep purple streaks and dots. *Capsule* glabrous, obsolately 5 angled. *Seeds* apparently glabrous, but were still unripe when the description was written.

As the Shevagerry plant differs somewhat in the form of the flower from the Courtallum one, I have added a representation of its flower to the figure. The differences are not material, but yet I think it well, to prevent future uncertainties, to show both forms. This part of the figure may not be found strictly correct, as it was made from a flower that had been dried and moistened again; but, if at all incorrect, the error must be inconsiderable, as great care was taken in laying out the different parts.

8. IMPATIENS *cordata.* (R. W.)

Herbaceous, erect, glabrous, except the veins on the upper surface of the leaves. *Leaves* alternate, cordate, ovate, acuminated, crenated; above glabrous, except a few bristly hairs on the veins; below glaucous. *Peduncles* axillary, 3—4 flowered, shorter than the leaves, lateral *sepals* large ovate pointed, a little shorter than the somewhat cuniate,

a. Courtallum plant.

b. Shevagerry form.

I. Grandis.

I. Uncinata.

emarginate upper one. *Spur* slender, much curved, longer than the petals. Lower lobes of the *petals*, very large, expanding; upper ones small, incurved, meeting in the centre and forming a vault over the column of fructification. *Capsule* ovate, glabrous.

Hab. Shevagerry, top of the hills; frequent.

This species seems allied to I. *umbellata* but is abundantly distinct. The large lateral sepals, a structure rare in the alternate leaved species, combined with the very unequal petal lobes, at once distinguish it from all the other peninsular species. The peculiar arrangement, and firm fleshy structure of the superior lobes of the petals, by which they completely conceal the column of fructification, forms another very distinct mark. The large lilac coloured flowers, contrasted with the darker purplish coloured centre, renders this a very beautiful species.

9. Impatiens *uncinata* (R. W.)

Herbaceous, erect. *Leaves* ovate, rarely cordate, acuminated bristle serrated, hairy on the veins above, glabrous beneath. *Petioles* rather long, glanduliferous at the apex. *Peduncles* axillary, solitary, nearly as long as the leaves, 4—8 flowered. Lateral *sepals*, about half the length of the upper one, ovate, pointed; lower, campanulate. *Spur* shorter than the flower, hooked at the point, contracted above, ventricose in the middle. Lower lobes of the *petals* declining, larger than the upper ones. *Capsule* attenuated below, beaked above, few seeded.

Hab. Courtallum—in moist alpine jungles; flowering in August and September.

A very distinct and handsome species, growing in thick shady jungles, on the tops of the hills moistened with frequent showers and almost constant mists.

10. Impatiens *campanulata*.

Herbaceous, erect, sparingly branched, glabrous. *Stem* and *branches* terete. *Leaves* alternate, long petioled, very broadly ovate lanceolate, shortly and abruptly acuminated, incurved bristle serrated; beneath glaucous, with the veins very prominent. *Peduncles* axillary, erect, longer than the adjoining petiole, 3 flowered. *Pedicels* about the length of the flower. Upper *sepal* keeled above, lower about equal, ventricose, with a small, short, incurved, spur; lateral ones, large; naviculate, about the length of the others. Upper lobes of the *petals* mucronate, shorter, the lower ones longer, than the upper sepals. *Capsule* ovate, attenuated at both ends, glabrous; *seeds* echinate.

Hab. Pulney hills, at an elevation of above 5,500 feet, in moist woods.

A rather large and handsome plant. The flowers large, cream-white, and speckled within with purple. The keel of the upper sepal green-

ish, ending in a mucronate point; the lateral ones, which are unusually large, very slightly falcate, the lower one speckled within like the petals. Anthers united and opening transversely across the apex.

Owing to the great size and incurving of the edges of the upper sepal over the upper lobes of the petals, they produce as a whole a campanulate form—hence the name.

11. IMPATIENS *viscida.* (R. W.)

Herbaceous, diffuse, rooting at the joints below, above erect; *stem* angled, a few bristly hairs scattered over it. *Leaves* alternate, longish petioled, ovate, somewhat acuminated, acutely serrated, veins on both sides, covered with stiff, erect, hairs. *Peduncles* axillary, 2—4 flowered, sometimes longer, but usually shorter than the adjoining leaf, erect, filiform, viscid. *Flowers* large; all the *sepals* about equal, the lower, furnished with a long tapering *spur*, nearly twice the length of the flower; lateral ones ovate, cordate. Upper lobes of the *petals* exceeding the sepals, 4 or 5 times shorter than the broad nearly semiorbicular lower ones. *Capsules* glabrous, tapering at both ends, ventricose. *Seeds* pendulous, hairy.

Hab. Pulney mountains, in wet swampy ground, at an elevation of about 5,500 feet. Flowers—large, pink.

§ 4. *Leaves alternate, flowers racemose.*

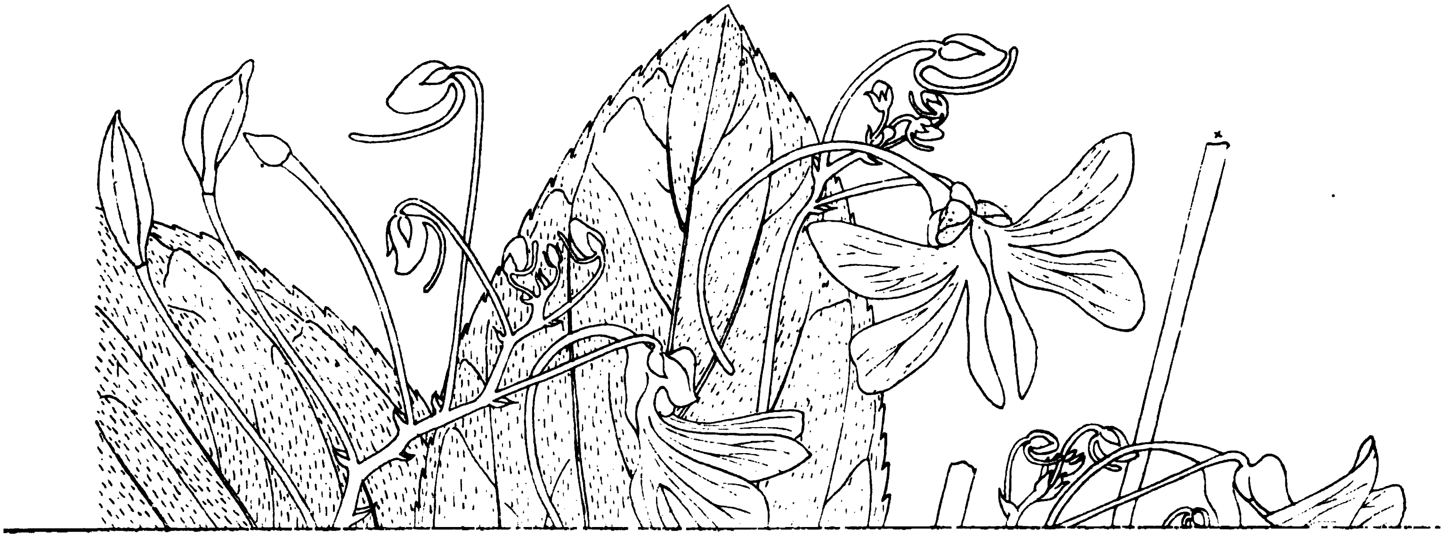
12. IMPATIENS *maculata.* (R. W.)

Herbaceous, erect, ramous. *Stem* and *branches* angled, speckled with brown spots, glabrous, except a few thinly scattered bristle-like hairs. *Leaves* longish petioled, glanduliferous, alternate, ovate lanceolate, acuminated, incurved, serrated, hairy on both sides. *Peduncles* axillary racemose, many flowered, longer than the leaves. *.Pedicels* from the axiles of small subulate bracteas slender declining, pendulous in fruit. *Flowers* large. Upper *sepal* vaulted, obtuse, shorter than the ovate acute lateral ones. *Spur* slender, curved upwards, longer than the petals, *Petals* 2 lobed, lower lobe, very large suborbicular, upper one, most minute, concealed under the upper sepal. *Capsule* 5 angled, glabrous.

Hab. Shevagerry, on the banks of mountain streams; flowering in August.

A large and very handsome plant, some of those which I saw, having attained the height of nearly 6 feet. The racemes, are sometimes very long, nearly a foot; usually they are about the length of the leaves, but have not, then, attained their full growth. Many of the petioles, and occasionally some of the lower serratures of the leaves, have glandular bodies springing from them, spirally involute, like the junior

I. Campanulata.



I. Rivalis.

fronds of ferns: these I have not introduced into the character owing to their not being constant, though of frequent occurrence.

§ 5. *Leaves radical, scape racemose.*

13. Impatiens *modesta.* (R. W.)

Leaves few, radical, broadly cordate, ovate or suborbicular, hairy above, glabrous, and pale shining glaucous beneath. *Scape* erect, racemose, many flowered; *flowers* small, rather long pedicelled, from the axil of a small subulate bractea. Upper *sepal,* broad, obovate; the lateral ones, subulate, incumbent on the upper; lower, shorter than the petals, with a short straight, obtuse *spur. Petals* declining, 3 lobed, (lower petal 2 cleft, upper entire) hairy near the attachment. *Capsule,* glabrous, ovate.

Hab. Shevagerry on the highest part of the hills, in wet moss on the trunks of trees and large stones; flowering in August.

This beautiful and modestly retiring species, I found in great abundance in the thickest jungles, quite covering the stems of trees and stones, covered with moss. The colour of the flowers is pale pink, but owing to the dark ground against which it grows and the quantities congregated together, becomes very conspicuous. The whole height of the plants rarely exceeds from 8 to 12 inches, and the leaves from an inch and half to two inches in their longest diameter; the number of flowers varies from about 10 to 20 or more. They have an unusual appearance, from the approximation and downward direction of the petals, causing them, till closely examined, to resemble a single petal, simulating in a remarkable manner, the flowers and lip of some of the *Orchideæ.*

14. Impatiens *rivalis.* (R. W.)

Herbaceous; root tuberous. *Leaves* all radical, ovate oblong, somewhat oblique at the base, with remote, incurved bristle serratures, hairy above, glabrous, pale shining green below. *Scape* racemose, many flowered. Flowers large, pedicelled, from the axils of small pointed fleshy bracteas. Upper *sepal* obtuse, gibbous above, forming an arch over the column; lateral ones minute; lower, large ovate, ending in a slender, tapering, *spur,* nearly twice the length of the petals. *Petals* large, spreading, the lower lobe two cleft. *Capsule,* erect, glabrous, many seeded; *seeds* hispid.

Hab. Courtallum, in clefts of rock in streams, where exposed to the spray of water dashing around them.

This very beautiful species is found growing in clumps, and producing abundance of large pale pink flowers. I first met with it on the rocks, at what is called 'Five Falls,' in a situation almost inaccessible,

and afterwards further up the same stream, in similar but more accessible places.

At the date of the publication of my *Prodromus*, only one species of this unusual form was known, the I. *Scapiflora:* since then, I have seen three or four more, namely, the two here described, and one or two, I am uncertain which, in Ceylon.

§ 6. *Leaves opposite, pedicels one flowered.*

15. IMPATIENS *fasciculata ?*

Herbaceous, erect, sparingly ramous at the base, glabrous, except the upper surface of the leaves, which is hispid. *Leaves* opposite, linear or lanceolate subsessile, cordate at the base, acutely subspinous, serrated, with two short, reflexed, subulate, interpetiolar stipule-like glands. *Pedicels*, one or two from each axil, shorter than the leaves, erect in flower, afterwards deflexed, pendulous. Flowers large; upper *sepal* broad cordate, keeled, retuse, mucronate; lower infundibuliform, scarcely half the length of the long linear, curved, slightly bifid, *spur*. Upper lobes of the *petals* triangular, pointed, about half the length of the upper sepal, and considerably shorter than the linear, acute, slightly falcate, lateral ones; lower lobes semiorbicular, notched at the point, 3-4 times larger than the upper sepal, but shorter than the spur. *Capsule* oblong, slightly ventricose.

This plant certainly differs in some respects from I. *fasciculata* as now characterized, but not enough, it appears to me, to admit of my drawing up a separate character for it, the principal points of distinction being in this having two interpetiolar glands, resembling stipules, in the serratures of the leaves, being spinous, and in the lower lobe of the petals being three or four times larger than the upper sepal, in place of only twice, the size according to the character.

There is yet another source of doubt as to their identity, the one grows on the plains of Malabar, the other on the elevated marshes of the Pulney mountains, nearly 6,000 feet above the sea. If new I would propose the name I. *pungens* in allusion to the spinous teeth of the leaves.

16. IMPATIENS *rosmarinifolia ?* (RETZ.)

" *Pedicels* solitary, shorter than the leaves, *leaves* opposite, linear: *spur* short, somewhat recurved at the apex."—*De Cand. Prod. Syst. Veget.* I. *p.* 636.

I have adopted Retz's specific name for this plant with a doubt, which however, I believe unnecessary, as the only difference between the plant here figured and the above character translated from Decandolle's *Prodromus*, is in the number of pedicels in that being solitary, in this solitary or paired, in my opinion a distinction of no importance. This species appears exactly intermediate between I. *filiformis* and I. *tenella;*

Rosmarinifolia.

differing from the former in having a spur, and from the latter in the spur being almost rudimentary and curved outwards, in place of as long as the flower, and straight. These differences are perhaps too slight, and might, in a considerable number of specimens, be found to pass into one another, in such a way, as to admit of all three being united under one name, but for the present, I do not feel warranted in making the attempt.

§ 7. *Leaves opposite or verticelled, pedicels several flowered.*

17. Impatiens *verticellata.* (R. W.)

Herbaceous, diffuse, glabrous. *Leaves* verticelled, long, narrow, lanceolate, remotely bristle-serrated. *Peduncles* shorter than the leaves, axillary, solitary, erect, 2—3 flowered. *Pedicels* about half the length of the peduncle. *Flowers* large. Upper *sepal*, oblong, erect, somewhat cuniate at the base; lateral ones, about half its length, subulate, reflexed. *Spur* slender, tapering, curved, much longer than the petals. *Petals*, oblong, lax, longer than the upper sepal, deeply 2 lobed, lower lobe much longer than the upper. *Capsule* oblong, obtusely 5 angled, slightly drooping.

Hab. Shevagerry, in the gravelly beds of mountain streams; flowering in August.

This beautiful species forms large clumps or beds, growing in the stiller parts of mountain streams, where gravel can collect, and is one of the most conspicuous and lively looking of the genus, from its large, deep crimson flowers, contrasting so strongly, with the dark green of its foliage. The whole plant is glabrous, the stems diffuse and jointed, each joint bearing a whorl of 4—6 narrow lanceolate leaves 4—6 inches long and scarcely ever one broad, much attenuated at both ends, paler beneath, and furnished, contrary to the usual character of the order, with subulate stipules; peduncles erect, about 2 inches long, bearing 2—3 pedicelled flowers; pedicels about half the length of the peduncles, filiform.

II.—*Clavis Analytica of the* Convolvulaceæ *of the Peninsula of India.—By* G. Walker-Arnott, Esq. a. m., f. l. s. and r. s. Edin. *Communicated, with Observations and Figures, by* Dr. Wight.

TO THE EDITOR OF THE MADRAS JOURNAL OF LITERATURE AND SCIENCE,

Sir,—The subjoined *Clavis Analytica* of the Peninsular *Convolvulaceæ* (prepared and communicated to me by G. Walker-Arnott, Esq.) I hope may prove as useful to your botanical readers as I have found it, in determining the species of that beautiful, but difficult, and hither-

to ill-understood, family of plants. In publishing it, I fear I am taking an undue liberty with my friend's manuscript, which he merely intended for my own use, as will appear from the following extract of his letter, but a fellow-feeling for all who have encountered the disheartening uncertainty attending attempts to unravel the species of this order, induce me to incur the risk of his displeasure, rather than deprive them of so valuable an aid. I may here premise, that I have met with one or two errors in the first two genera, two or three species of *Rivea* being referred to *Argyreia*, which, however, is of little consequence, as the precision of the generic characters, will soon lead to their correction. It is proper to add, that these are not chargeable to Mr. Arnott, he having simply reduced to a tabular form the species according to M. Choisy's determination, adding a few new ones in my collection, not seen by that gentleman when elaborating his memoir.

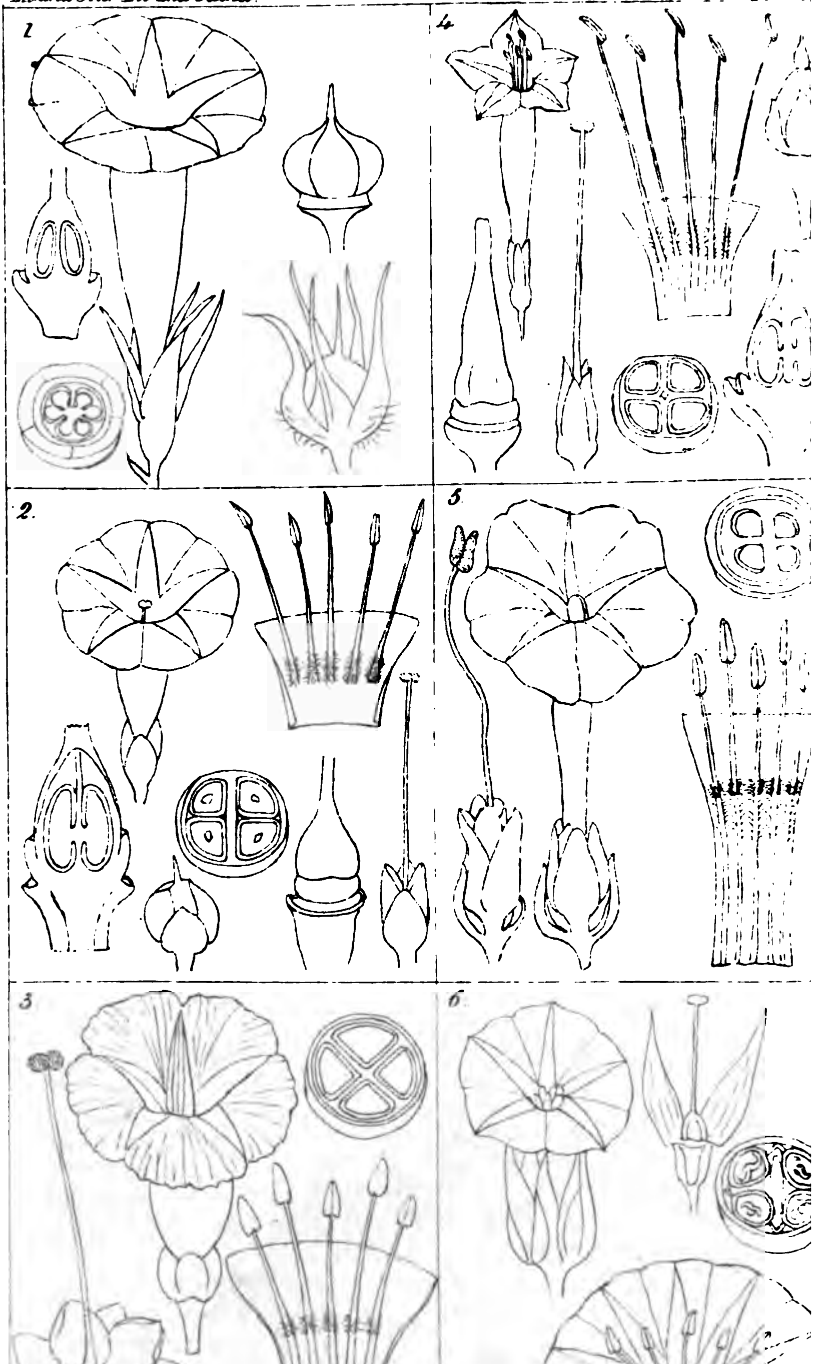
"As M. Choisy's memoir on the Indian *Convolvulaceæ* is inaccessible, (being printed in a foreign Society's transactions) I have got a loan of it from our friend Sir W. J. Hooker, and as *Convolvulaceæ* appears to be a favourite Order of yours, I shall here present you with a Clavis Analytica, adapted solely to the peninsular species, which I have made out from his specific characters for my own use. You of course understand, that in the Clavis I reject all characters (good or bad) that are not essential to your making out the plant: it is possible therefore, that ere this you may have got some new ones, in which case they, by the Clavis, may appear to coincide with what they are really distinct from."

The letters appended to the accompanying figures, show the successive steps of the operation of examining a plant, that at end of first step, refers to the second, the second to the third, &c. The species *Ipomea obscura* has been selected as a favourable example from its going through so many successive steps. These when put together form a very complete character : thus —" *a* stems twining—*g* capsules and sepals moderate sized or small—*m* flowers not capitate—*p* leaves cordate—*q* leaves entire—*r* flowers two or three—*u* one to three flowered—*v* leaves cordate acuminated, stems glabrous or softly villous. I. *obscura*."

As it appears not improbable that there are some additional genera, as well as species, not included in this Clavis, natives of the peninsula, I send along with it M. Choisy's own *Conspectus Generum*, published in the *Annales des Sciences Naturelles*, for September 1834, and leave you to determine on the propriety of reprinting it among your selections.

I remain, &c.

Robert Wight.


1
4
2.
5.
3
6.

CONVOLVULACEÆ.

Clavis of the Genera.

	Embryo, without cotyledons.............	15	Cuscuta.
	——— with cotyledons. A.		
A	Fruit, a dry berry. B.		
	——— capsular. C.		
B	Ovarium, 4 celled........................	1	Rivea.
	——— 2 celled........................	2	Argyreia.
C	Styles, single undivided. D.		
	——— single and bifid, or 2 styles. K.		
D	Ovarium, 4 celled. E.		
	——— 3 celled........................	5	Pharbitis.
	——— 2 celled. F		
	——— 1 celled. I.		
E	Corolla infundibuliform: stamens exserted..................................	3	Quamoclit.
	——— campanulata: stamens included.	4	Batatas.
F	Stamens exserted, coroll. infundibuliform	6	Calonyction.
	——— included. G.		
G	Lobes of stigma, globose. H.		
	——— filiform or terete......	8	Convolvulus.
H	Sepals, verticillate......................	7	Ipomæa.
	——— inserted, some lower down than others................................	9	Aniseia.
I	Lobes of stigma, flattened—ovate......*	10	Hewittia (W&A).
	——— globose, sepals enlarged after flowering....................	11	Porana.
K	Styles 1. bifid: anthers included........	12	Breweria.
	——— 2, L.		
L	Styles, undivided: stigmas globose, anthers exserted..........................	13	Cressa.
	——— each bifid......................	14	Evolvulus.

Clavis of the Species.

1. Rivea. *Ch.*

	Corolla inflated, cylindrical.............	1 R. tiliæfolia, ch.
	——— with limb spreading. *a.*	
a	Corolla hypocraterif., tube equal, narrow, peduncles 1 flowered...............	2 R. hypocraterif, *Lam.*
	——— infundibulif., tube wider upwards, peduncles 3 flowered or with 2 lateral abortive ones........................	3 R. bona-nox.

* 10 Shuteria *Ch.* (not W. & A.)

2. Argyreia. *Lour. Lettsom. Roxb.*

	Stamens included. *a.*	
	——— protruded beyond the tube. *p.*	
a	Leaves tomentose, silky, or velvetty on the under side. *b.*	
	——— villous, or pubescent, glabrous or hairy on the under side. *h.*	
b	Leaves cordate at the base. *c.*	
	——— elliptical, oblong, or lanceolate. *e.*	
c	Leaves softly tomentose and silky underneath; flowers somewhat umbelled. *d.*	
	——— harshly tomentose, underneath; flowers cymose, stems hairy..........	4 A. hirsuta (W & A.)
d	Stems tomentose: bracteas oval, acuminated waved..........................	5 A. speciosa.
	——— pubescent or glabrous; bracts lanceolate or linear.....................	6 A. argentea.
e	Leaves glabrous on upper side. *f.*	
	——— clothed on upper side. *g.*	
f	Leaves roundish oblong, acute..........	7 A. bracteata, Ch.
	——— lanceolate acuminated..........	8 A. fulgens, Ch.
g	Leaves subacute, upper side strigosely hirsute, under serices tomentose..........	9 A. Leschenaultii, Ch.
	——— obtuse, both sides velvetty........	10 A. pomacea, Ch.
h	Leaves cordate at the base. *i.*	
	——— not cordate. *o.*	
i	Stem harshly hairy. *k.*	
	——— glabrous, or pubescent or villous. *m.*	
k	Flowers capitate, capitulum surrounded by bracteas...........................	11 A. capitata.
	——— umbelliform, bracteas all mingled with the flowers. *l.*	
l	Hairs reddish; sepals ovate, elliptical obtuse....................................	12 A. Neelgherryana.
	Leaves underneath livid or glaucous, sepals linear lanceolate pointed..........	13 A. pilosa (W. & A).
m	Exterior sepals equal to, or smaller than the others: leaves with a short broad sinus..................................	14 A. papulifolia, Ch.
	——————— the largest and with margins revolute. *n.*	
n	Stem and leaves villous or softly pubescent	15 A. Roxburghii.
	——————— sprinkled with short adpressed pubescence, or glabrous........	16 A. Malabarica.

Batatis Paniculata.

o	Leaves obovate-cuneate, emarginate; peduncle 3-6 flowered....................	17	A. cuneata.
	—— elliptical ovate or obovate; panicle lax corymbose....................	18	A. elliptica.
p	Flowers capitate, leaves tomentose underneath..............................	19	A. aggregata.
	—— corymbose or cymose. *q.*		
q	Stem and underside of leaves hirsute or strigose with adpressed hairs; peduncles a little longer than the petiole.........	20	A. setosa.
	—— and leaves more or less pubescent; peduncles the length of the leaves......	21	A. cymosa.

3. Quamoclit. *Ch.*

Leaves entire, or angled, or 3 lobed......	22	Q. phœnicea.
—— pinnately cut....................	23	Q. vulgaris.

4. Batatas. *Rumph.* and *Choisy.*

	Leaves entire, angled or cleft—*a.*		
	—— quinate : stem twining, hirsute..	24	B. pentaphylla.
a	Sepals ovate lanceolate, a little unequal : stems usually prostrate; peduncles few flowered............................	25	B. edulis.
	—— roundish, ovate, equal : stem twining glabrous : peduncles many flowered...	26	B. paniculata.

5. Pharbitis. *Ch.*

Leaves entire; pedicels longer than the bracts, nearly as long as the sepals....	27	P. hispida
—— 3 lobed or entire, pedicels usually shorter than the bracts, about ⅓ of the length of the sepals..................	28	P. nil.

6. Calonyction. *Ch.*

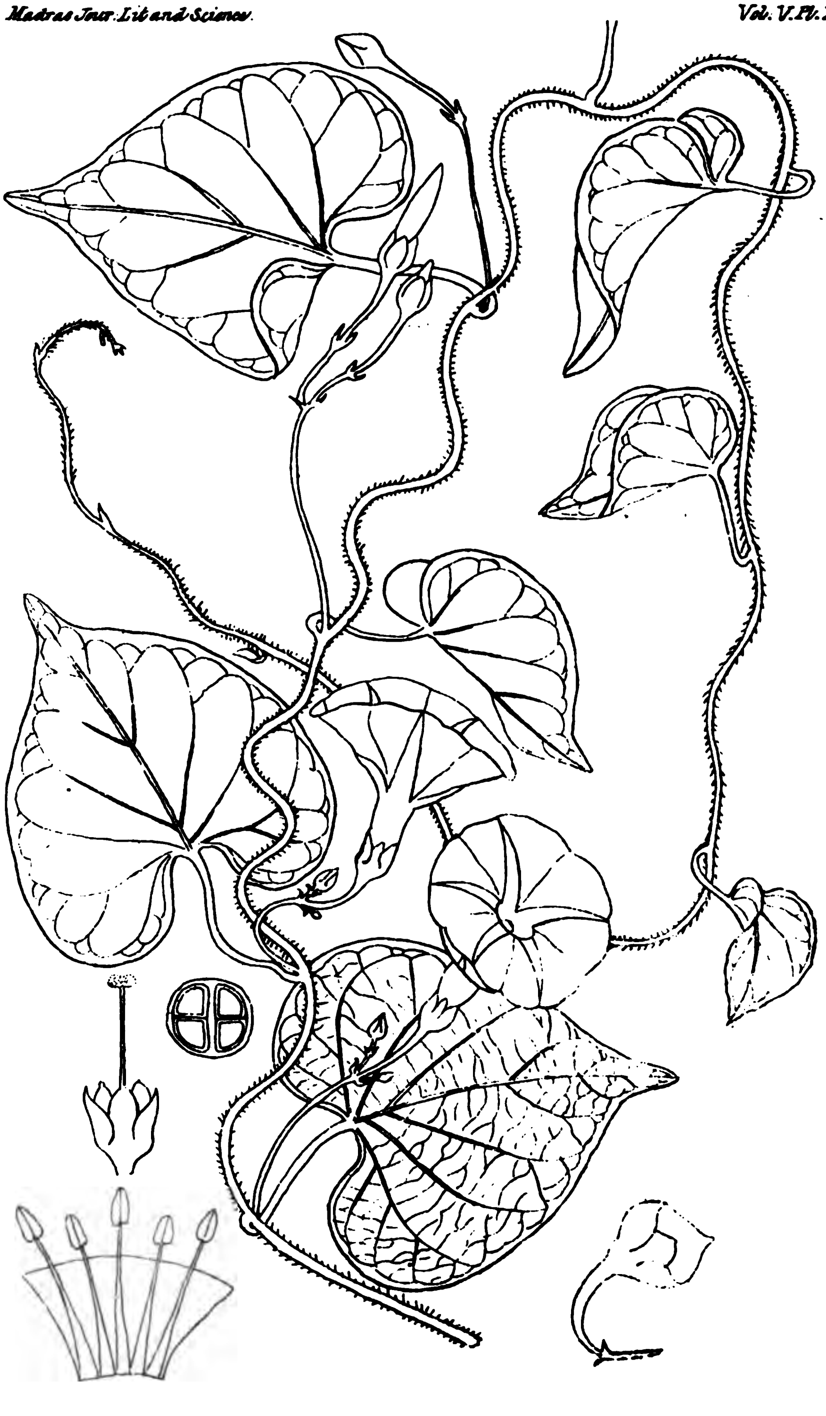
Sepals equal, with an awl-like point; flowers, large, white......................	29	C. speciosum.
———— —— flowers smaller, purplish	30	C. speciosum.
—— unequal, obtuse, or with a very short point.........................	31	C. asperum.

7. Ipomæa. *Linn.*

Stems not twining—*a.*

—— twining—*g.* (§ Strophipomœa.)

a	Stems creeping, and throwing out roots —*b.* (§ Erpipomœa.)		
	—— prostrate, not creeping—*f.* (§ Orthipomœa) leaves auricled at base: plants glabrous.		
b	Leaves sagittate lanceolate, acute........	32	I. reptans.
	—— obtuse or emarginate—*c.*		
c	Glabrous; sepals wrinkled: flowers pretty large—*d.*		
	more or less hirsute: sepals not wrinkled: flowers small—*e.*		
d	Leaves emarginate or 2 lobed...........	33	I. pescapræ.
	—— cordate reniform obtuse...........	34	I. rugosa.
e	Leaves reniform obtuse, sinuately toothed: sepals ovate rounded, ciliately torn.....	35	I. reniformis.
	—— cordate, reniform obtuse or emarginate, entire: sepals linear lanceolate, hairy	36	I. venicifolia.
f	Leaves usually truncate or 3 toothed.....	37	I. tridentata.
	—— linear or linear lanceolate..	38	I. filicaules.
g	Capsules and sepals large and showy—*h.*		
	———— moderate size or small—*m.*		
h	Leaves cordate, entire or sinuate—*i.*		
	—— divided—*k.*		
i	Stem angled or winged: sepals unequal, densely pubescent....................	39	I. turpethum.
	—— terete: sepals equal, glabrous......	40	I. campanulata Ch.
k	Leaves palmately 7 partiti—*l.*		
	—— cordate, palmately 5 cleft or 5 angled	41	I. vitifolia.
l	Lobes of leaves quite entire..............	42	I. tuberosa.
	———— sinuately toothed or pinnatifid.	43	I. dissecta.
m	Flowers capitate or aggregated—*n.*		
	—— not capitate (in I. Wightii approximated)—*p.*		
n	Leaves palmate or lobed, peduncles as long as the leaf..........................	44	I. pestigrides.
	—— cordate acuminated—*o.*		
o	Peduncles a little shorter than the petiole: flowers inclosed in a perfoliate involucre	45	I. pileata.
	—— very short: flowers not involucred.	46	I. cessiliflora, Roth.
p	Leaves cordate entirely or slightly lobed—*q.*		
	—— digitate or pedate—*y.*		
q	Leaves entire—*r.*		
	—— toothed, lobed—*w.*		



Convolvulaceæ Pl: 2 _ Ipomæa Obscura.

Convolvulus Rottlerianus.

r { Flowers cymose or panicled—*s*.
{ —— 2—3, or umbelliform—*u*.

s { Flowers racemosely panicled, leaves ovate oblong acuminated, cordate, 3-6 inches long .... 47 I. staphylina.
{ —— cymose : peduncles shorter than the leaves—*t*.

t. { Leaves ovate lanceolate, a little obtuse mucronate (a doubtful plant) .... 48 I. caliginosa.
{ —— ovate, oblong, elongated, acute or acuminated .... 49 I. cymosa.

u { Peduncles many flowered, stem usually sprinkled with hairs .... 50 I. sepearia.
{ —— 1—3 flowered—*v*.

v { Leaves cordate, acuminated : stem glabrous or softly villous .... 51 I. obscura.
{ —— cordate lanceolate with a blunt point : whole plant glabrous .... 52 I. triantha.

w { Flowers yellow ; style exserted ; leaves glabrous .... 53 I. chrysoides.
{ —— purple, style included : plant hairy : leaves tomentose underneath—*x*.

x { Flowers cymose, distant, numerous .... 54 I. pilosa.
{ —— usually few on each peduncle, approximated .... 55 I. Wightii.

y { Segments of leaves serrated .... 56 I. coptica.
{ —— quite entire—*z*.

z { Leaves tripartite, the segments trifid .... 57 I. dasysperma.
{ —— quinate—*&c*. ....

& { Corolla infundibuliform ; seeds villous .... 58 I. pulchella.
{ —— campanulate : seeds glabrous .... 59 I. tuberculata.

8. Convolvulus. *L.*

Stem erect ; peduncles longish .... 60 C. Rottlerianus, Ch.
—— twining—*a*.

a { Peduncles few, 1 to 3 flowered—*b*.
{ —— umbellately many flowered .... 61 C. parviflorus.

b { Leaves sagittate, somewhat auricled ; sepals obtuse .... 62 C. arvensis.
{ —— hastate cordate, sinuately toothed : sepals ovate acuminated .... 63 C. refuscens, Ch.

9. Anisеia. *Ch.*

Stem hairy, twining, leaves oblong cordate, acuminated, longish petioled .... 64 A. calycina Ch.

Stem glabrous or nearly so, rooting, leaves oblong, linear or cuneate, very shortly petioled.............................. 65 A. uniflora.

10. HEWITTIA. *W. & A. Shuteria Ch. (not W. & A.)*

1. H. bicolor W. & A. (C. bicolor Vahl. & C. bracteatus Vahl.)

11. PORANA. *Burm.*

1. P. paniculata Roxb. (perhaps not indigenous).

12. BREWERIA. *R. Br.*

Stem twining, leaves cordate ovate, acuminated, softly villous, petioled, 2 inches long.................................. 66 B. Roxburghii ch.

Stem erect: leaves from oblong lanceolate, to oval and obtuse, almost glabrous, subsessile, 1½-2 lines long................. 67 B.

13. CRESSA. *L.*

1. C. indica Retz.

14. EVOLVULUS. *Linn.*

Leaves almost sessile, hirsute on both sides..68 E. hirsutus L.

——— shortly petioled (various as to shape and hairiness) .... 69 E. alsinoides L.

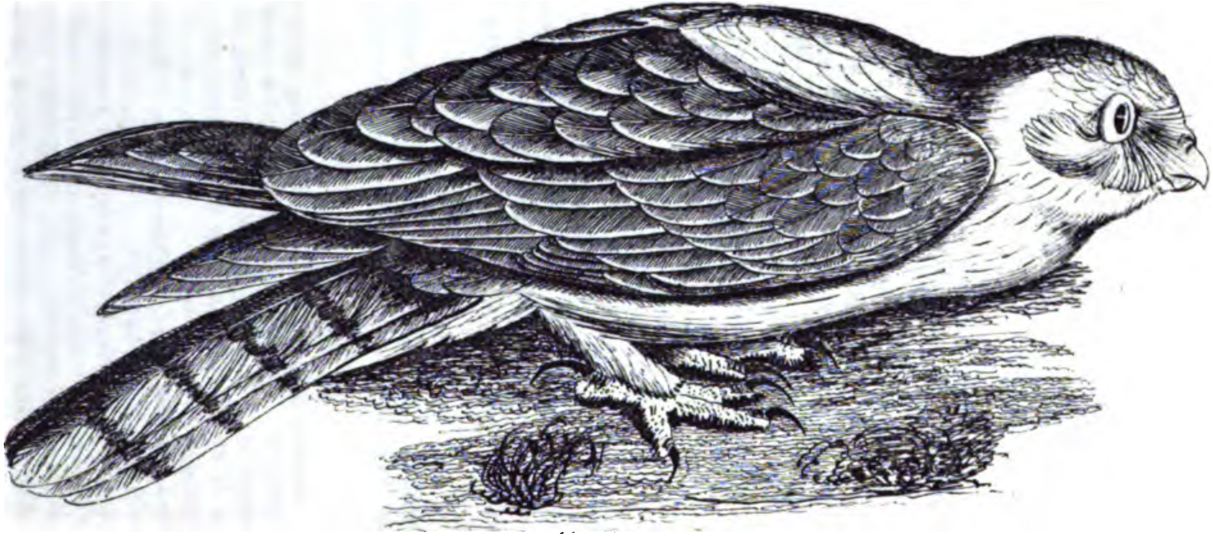
15. CUSCUTA.

Flowers racemose, 5 cleft: style 1........ 70 C. reflexa R.

Peduncles 3 flowered, flowers 4 cleft: styles 2. 71 C. hyalina R.

SYNONYMS.

1 Convol. gangeticus Roxb. 2 Letts. uniflora Roxb. 3 Letts. bona-nox Roxb. 5 L. nervosa R. 6 L. argentea R. 8 Convol. fulgens Wall. 10 Letts. pomacea. 11 Letts. strigosa R. 14 A. bracteata Wight in Comp. Bot. Mag. t. 3. 15 Ipom. multiflora R. 16 C. malabar. Linn. 19 Letts. aggregata. 20 L. setosa R. 21 L. cymosa R. 22 Ipom. phœnicea R. 23 Ip. Quamoclit L. 24 C. hirsutus Roxb. C. munitus Wall. 25 Con. Batatas L. 26 C. paniculata L. 27 C. purpureus L. 28 Ip. cœrulea and cœrulescens, Con. nil Linn. 29 Ip. bona-nox L. Ip. grandiflora Roxb. 30 Ip. muricata Linn. and Roxb. 31 C. asper. Wall. 32 Convol. repens Roxb. 33 Ip. pescapræ C. bilobus R. 34 C. flagelliformis Roxb. 35 C. renif. Roxb. 36 C. hirsutus Wall. 38 C. medius R. not Linn. 40 not Linn. the Linn. plant is Rivea tiliæfolia. 41 C. vitifol. R. 43 I. diversifolia Ch. not Br. 46 C. sphœrocephalus R.



Ninox Nipalensis,
type of the
Genus Ninox (Hodg)

47 C. Kleinii Sp. 49 C. blandus R. and C. pentagonis R. 51 C. obscurus Willd. 52 perhaps a variety of Ip. cymosa. 53 C. dentatus R. C. flavus Willd. 54 C. pilosus R. 55 C. Wightii Wall. Pl. As. Rar. 57 C. pedetus Roxb. 58 C. digitatus R. 61 Retzio pilosi Rott. 62 C. Malcomi R. 64 Con. calycinus R. 65 C. uniflorus Burm. C. emarginatus Vahl. C. Rheedii Wall. 66 C. Semidigynus. 67 Ip. parviflora Rott. 68 E. sericius Wall. E. angustifolius R. 69 These two probably the same species.

Explanation of Plates.

Plate I.

Fig. 1. Pharbitis A. C. D. ovar. 3 celled.
„ 2. Ipomea A. C. D. F. G. H. sepals verticillate.
„ 3. Batatas A. C. D. E. corol. campanulate, stamens included.
„ 4. Quamoclit A. C. D. E. corol. infundibuliform, stamens exserted.
„ 5. Rivea A. B. ovar. 4 celled.
„ 6. Aniseia A. C. D. F. G. H. sepals inserted, some lower down than others.

Plate II.

Ipomea obscura.—a. g. m. p. q. r. u. v. I. obscura.

III.—*Indication of a new Genus belonging to the Strigine Family, with Description of the New Species and Type.*—By Brian Houghton Hodgson, Esq. British Resident in Nepal.

Family Strigidæ.
Sub Family Noctuinæ.
Genus Ninox, *nobis (a Niso et Noctua).*
Type Ninox *Nipalensis, nobis.*

Character.—Bill, disc, conch, and feet as in *Noctua.*—General contour, with the character of the plumage, strictly falconidine. Wings long and firm, 3d quill longest, 1st and 2d moderately gradated; the primes, pretty strongly emarginated high up from the tips; their edges, entire or nearly so. Tail long, straight and even. *Type, Ninox Nipalensis, nobis. Habitat,* central region of Nepal. Habits, insectivorous and crepuscular.

The experienced *Shikaree* who brought me, recently, a fine male specimen of this bird, asked me, when he put it in my hands, whether it was a *Baáz* (hawk) or an *Ulu* (owl)? And the more I examined its graceful form, its unrelaxed plumage, its strong and ample wings and tail, and even its peculiar colouring, the greater reason did I perceive to admire the man's acuteness of observation. It is an owl, undoubt-

edly, but the most accipitrine of owls; and, much as the peculiar attributes of Noctua had prepared me to expect, in or near this group of the Strigidæ, the type and symbol of the Accipitrinæ, I did not hope that the forests of Nepal would so soon yield that type to my own hands.*

SPECIES new, *Nipalensis nobis.*

Form.—Bill to head as 1 to 1¼ inch, short, arched from the base, considerably compressed and feeble rather before the large cere; the tomiæ entire and very little trenchant; tip of lower mandible very obliquely and slightly truncated. Nares small, round, anteal, furnished with a central pillar, and partially free and apert; the cere behind them swollen semitubularly, and soft. Head very small and accipitrine, void of egrets, almost so of facial disc, and only strigine in the size and position of the eyes. Opening of the ears but $\frac{3}{10}$ of an inch long, nearly round, quite simple, and protected by a cross row of setaceous plumes. Tail equal to the body in length, composed of 12 firm and unbowed feathers, of nearly equal length, but tending to a rounded form at the end. Wings 1¼ inch less the tail; 3d quill decidedly longest; 1st but two inches, and 2d, only half an inch less the 3d; 1st to 4th inclusive sharply emarginated on the inner web, remotely from the tips; and 2d to 5th on the outer; all firm and nearly or quite void of strigine characteristics: tertiaries nearly two inches less the primaries: scapulars as much shorter again. Tarsi submedial, slender, moderately plumed. Toes rather long, cleft, void of plumes, covered by rigid hairs which become spinous laterally near the soles; lateral fores, equal; central, not elongated; hind, small; all cleft; soles of the fores, depressed, flat and papillose; of the hind, full. Talons long, slender, very acute, subequal; inner and central equal; outer fore, less; hind, least: inner process of the central one intire; fores, flat beneath—the hind, rounded. Plumage, generally, neither lax nor soft.

Colour and *size.*—Above, a medial earthy brown; beneath, sordid rusty from chin to breast, and white from breast downwards. Disc, towards the bill, hoary; towards the head, brown. Superior surface of the bird unmarked save on the tail, which has six, broad, regular bars equal to their paler intervals, and five of them apert: ground colour of the inferior surface, largely picked out with longitudinal central drops of brown, spreading as you descend the body, and changing into hearts on the flanks; tibiæ and tarsi sordid rufous, with vague cross bars of

* I regret I have no species of *Surnia* wherewith to compare our bird. *Surnia* may possibly dispute with it the honour of typifying the nobler races of the Falconidæ: but the thickly plumed toes and wedged tail of *Surnia*, sufficiently indicate that our bird is not of that genus.

brown: vent and under tail coverts, pure white: lining of the wings, impure rufous, like the breast, and bimaculate barwise with brown: the quills internally on the inner webs, barred with pale pure rufous. Feet, bright yellow; bill and nails blackish blue horn; cere greenish; iris golden yellow. Intire length of the bird (male) twelve inches; of the tail, six; of the bill, one; of the tarsus, $1\frac{6}{16}$; of the central toe, $1\frac{3}{16}$; of its nail (straight) $\frac{5}{16}$; of a closed wing, $8\frac{3}{4}$. Weight 7oz. Expanse of wings, 27 inches. Intestinal canal 16 inches long, of medial subequal caliber. Two inches from anal end, two cæca, each of $2\frac{1}{4}$ inches in length, and slender, with enlarged globose distad extremities. Stomach soft, large, spheroidal, distinctly solvent, but considerably thickened in the outer coat, and submuscular on the surface. Contents, large black beetles.

Comparing our bird with Noctua, to which it has the closest affinity, it may be observed that the accipitrine tendencies of the genus are here much more apparent, particularly in the decreased size of the head, the greatly superior development of the wings and tail, and the greater firmness and still closer set of the whole plumage. The tarsi are rather lower, and the bill is more compressed before the cere, than in Noctua; nor have the wings the same technical formula. But these distinctions are trivial in comparison to the high development of the general falconidine (family of Diurnal Raptores) structure in our bird; and which structure is, as it were, latent in Noctua.

Noctua approaches the Diurnal Raptores by its firm plumage, and the very small development of the ear conch and of the disc, not to mention the absence of egrets, and the small head. Our genus can scarcely be separated from the sub-family of the Noctuinæ, which latter would appear to *include* the Surnianæ. Or, if the latter be allowed a sub-family distinctness, I know of no genera fit to be ranged under it, as the analogical equivalent of the Accipitrinæ and Falconinæ, save Surnia and our Ninox, the genus Surnium of authors being much more strigine than the type of the Noctuinæ. Our genus has wings less than the tail, but longer in proportion to it than Accipiter. It may be a question, therefore, whether Ninox symbols Accipiter or Falco. Our bird at ten paces, would pass for a Tinnunculus, with which it agrees very much in structure and in habits (insectivorous). *But*, in Tinnunculus there is a wide deviation from the type of Falco: and the truth would seem to be the Diurnal as well as Nocturnal Raptores require to be reclassified.

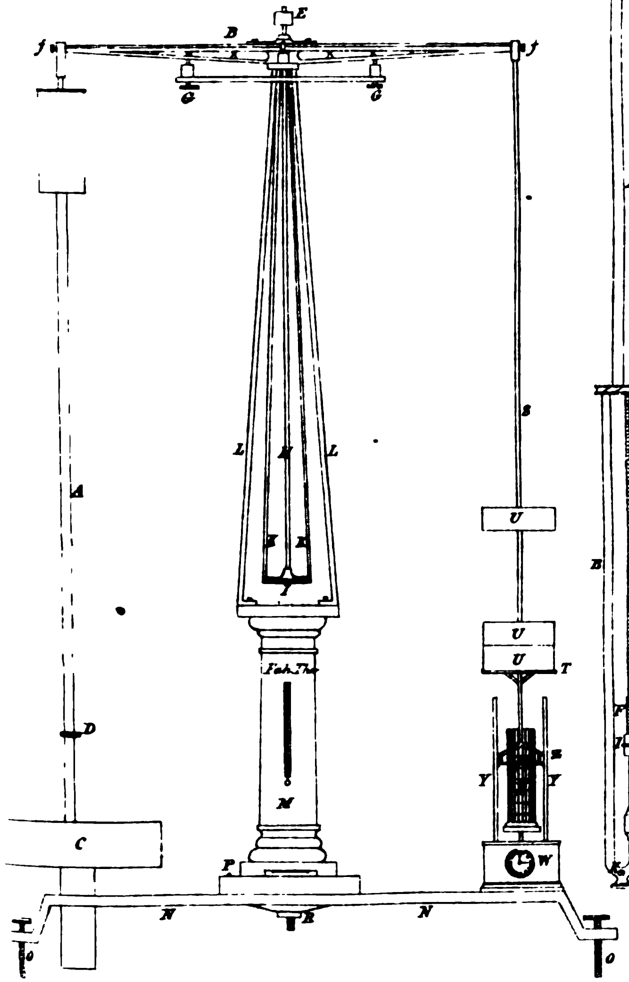
IV.—*Description of a Plan for a Self-Registering Barometer, and for the Construction of Metallic-tube Barometers.*—*By* William Gilchrist, Esq. *of the Madras Medical Establishment.*

A Barometer that will record constantly, and with scientific accuracy, the varying pressure of the atmosphere, is, so far as I know, a desideratum in the study of Meteorology. This important object may, I conceive, be accomplished by suspending a barometer tube from one end of a balance—an apparatus being connected with the other to record the oscillations occasioned by the varying weight of mercury in the tube, or, more correctly, the varying pressure of the atmosphere on the top of the tube, and of which the height of the mercury within is an exact measure.

In principle the barometer is a balance of a very delicate kind, its function being to *weigh* a given column of the atmosphere, by counterpoising its weight with a column of mercury—like the balance, therefore, this instrument requires simplicity of construction, since a complicated structure would impede its free working, and, of consequence, falsify its indications. The nearer the principle of the balance, therefore, is approached in a barometer intended to register its own movements, the better is it adapted for the exact purposes of science. In the plan about to be described, this object will be found fully attained, since a balance is made the medium of register.

The accompanying is a sketch of the instrument (Pl. 15. fig. 1.)—A is a tube, suspended from one end of the balance B. The tube is of cast iron, cast in the shape required, thereby avoiding the tediousness of boring. The upper part, it will be observed, is considerably larger than the lower. I purpose making the interior of this part with a uniform area of two square inches. The evident object of this is to *gain power*, for the larger the area of the bore, the greater is the weight of mercury displaced or added, according to the depression or elevation of the column of mercury, and consequently the apparatus has a proportionally greater power to overcome resistance, which at most can be very small. A cubic inch of distilled mercury weighs 3.434 grains, which divide by 1000 = 3.434, so that an atmospherical alteration that would affect the barometer $\frac{1}{1000}$ of an inch gives nearly 3½ grains of power—two square inches of area, then, will give nearly a power of 7 grains to indicate the third decimal figure, and nearly 70 grains to indicate the second or $\frac{1}{100}$ of an inch; so that it is evident the above power is amply sufficient to overcome all obstacle, and to admit of recording variations of the mercurial column to $\frac{1}{1000}$ of an inch, a degree of minuteness amply sufficient to meet the most exact demands of science. The upper part of this tube must be bored accurately—as on the uniformity of caliber of this portion of the tube the correctness of the instrument essentially depends. This

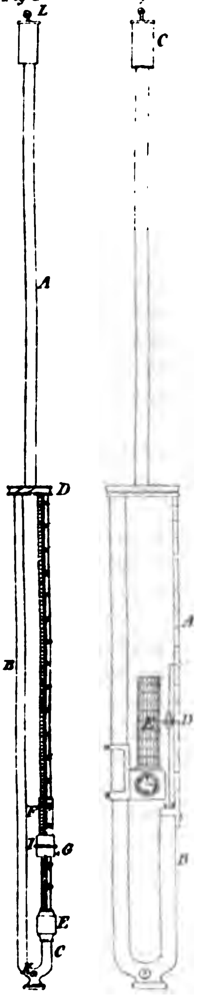
Balance self Registering Barometer



Metallic tube Barometers

Fig 1st

Fig 2nd



T. Gilchrist. Inv. et del.

point must be determined with the greatest nicety. C is the cistern, the broad upper part of which is 12 inches in diameter, while the lower is of such bore as to admit of the tube moving up and down without touching the sides of the former. The cistern consists of cast iron, and, when the apparatus is being conveyed, the screw D is screwed into the top, thereby preventing the escape of the mercury. The balance B is constructed on the usual principles; the weight E on the top adjusts the centre of gravity, while the screws F F, at the end of the beam, adjust the length of each arm; other screws, which cannot be shown, adjust the points of suspension to the plane of the point of support,* the screws G G support the balance when not in use—H is the index of the balance having a vernier at its lower end—I is a plummet, in the shape of an arc, the two radii K K which support it, turn on a pivot which is in the plane of the point of support of the balance—this plummet of course will always preserve the perpendicular: it is graduated into parts corresponding with the $\frac{1}{10}$th of an inch of elevation or depression of the mercury in the tube, so that, by means of this scale and the vernier on the index, the exact height of mercury at any time may be determined thereby—thus avoiding the necessity of disturbing the registering apparatus.

The inclined arms L L and the pillar M support the balance and its appendages. The stand N N is furnished with screws O O by way of feet, by which it is brought to the horizontal line, as indicated by spirit levels, one of which is seen in front of the bottom of the pillar. The end of another, at right angles to the former, is seen below P—the pillar is, by means of the screw and nut R below the stand, easily attached to, or removed from this.

The registering apparatus is seen attached to the right arm of the balance—S is a rod, on which at T is attached a disc of any metal, by way of scale pan; on this are placed weights U U U, which poise the the barometer at different elevations of places of observation. In the box W the clock work is contained, which turns the arbor on which the register cylinder X is fixed, after the manner of the cap of a watch. From the box W two rods Y Y rise up perpendicularly, which are guides to the pencil frame Z—(a) is the pencil which is on the principle of Mordan; it is acted on by a delicate spring which causes the point to press gently against the cylinder. This cylinder consists of ivory, the surface of which is made smooth but not polished—longitudinally are 24 lines—which are hour lines—being numbered 1, 2, 3, &c. on to 24. The horizontal lines correspond to $\frac{1}{10}$ of an inch of the barometrical tube at the other end of the balance. The middle horizontal line is called the zero line. By this I mean that when the instrument is put in

* See Mr. B[illegible]'s plans of the balance—*Madras Journal of Science*, No. 6.

action the pencil is said to touch this line, the balance having been previously poised by weights put in the scale pan. The height of the barometer, as indicated by one of common construction, is then noted, while the cylinder is revolving, the pencil will draw a line either above, on or below this zero line, according to the height of the mercury, at the time indicated by the hour lines. After completing one revolution the cylinder is removed and another replaced; it is then placed between two points and made to revolve, when being read off, against a vernier, so that variations to $\frac{1}{100}$ of an inch, as in the common barometer are distinctly seen. The register may be preserved either in figures or by diagrams, as represented in meteorological works.

That an apparatus, such as the one above described, will fulfil the purpose for which it is intended, there can be no doubt. The principle on which it is founded may easily be illustrated by immersing a common beer bottle in water until filled; it is then to be taken so far out as to leave only the mouth immediately below the surface, and then suspended by a string (previously so applied as will retain the bottom uppermost) from one end of a balance; counter weights are then put into the opposite scale pan, until the bottle is poised. If, now, air be blown up into the bottle by means of a tube, a portion of water will immediately descend, and the bottle end of the balance become as much lighter as the quantity of water displaced. If the above arrangement of apparatus be placed beneath the receiver of an air pump, and the air extracted from the latter, the water will descend without the necessity of blowing in air, and the weights, as in the former case, preponderate. It is a well known law that fluids, whether aeriform or liquid, press equally in all directions. The pressure of the atmosphere rises and supports the column of mercury in the common barometer. It is evident, then, with reference to the law in question, that the *top* of the tube is pressed on with a force equal to the weight of mercury thus supported. So that if an air-tight plug (putting friction out of consideration) were adapted to the top of the tube, this would move downwards to fill the vacuum on the top of the mercury, with as much force as that by which the mercury begins to rise from below. Now as the weight of the mercury varies by the varying length of its column, in the exact same degree does the atmospheric pressure on the *top* of the tube vary. Suppose now a barometer tube, suspended from one end of a balance, its lower end immersed in mercury, to be exactly balanced by weights placed in an opposite scale pan.

Further, suppose the mercury in this tube to stand at 28 inches. Let now a variation of atmospherical pressure occur as will raise the mercury one inch. It is evident then that the tube is pressed down with a weight equal to this inch of mercury. The heavier end, that to which the barometer tube is attached, will therefore descend, occasioning a

corresponding elevation of the other end of the balance, and of course of the pencil bearing on the register cylinder below.

The indications on the roller may be magnified several times by making the register arm of the balance longer than the other.

Metallic-tube Barometers.—The very great liability of the common barometer to derangement from the entrance of air, and the great danger of destroying the instrument in attempting to expel this by the only efficient mode—viz. boiling the mercury in the tube—has long been the bitter complaint of the scientific traveller and meteorologist. With reference to India, the truth of this remark is abundantly evident. I have met with very few who possess barometers, the uselessness of which, simply from air having entered the tube, did not occasion them to regret their distance from the instrument maker.

Various plans have been invented to prevent, as much as possible, this liability to the entrance of air; amongst which perhaps the best is the walking-stick barometer of Englefield: but all have the common disadvantage of glass tubes, and therefore are subject to be destroyed by fracture when the mercury is attempted to be boiled in them. I consider it practicable to substitute iron for glass, in so much of the barometer as it is necessary to expose to heat to expel air, and consider that the plan, represented by *fig.* 2, of the accompanying sketches, will fulfil that desirable object. A B C represents a tube of malleable iron, which is forged in a straight line, and bent as represented after a hole has been bored through it. The short limb C D consists of a common barometer glass tube, encased in one of brass, the intervening space being filled up with magnesian cement. The lower part of the glass tube passes through a disc of iron, which is convex below to apply exactly to the somewhat hollow expanded end of the metallic tube. On the side of this expanded end is a screw which fits a corresponding one inside of the lower end of the brass tube; by which means the two limbs are firmly connected; also being made to apply exactly, thereby preventing any escape of mercury. In order to ensure the exact adaptation of these two parts, the iron disc and expanded portion of the metallic tube are ground together before the latter is bent.

The part M, or the upper portion of the tube, has a diameter of one inch—the remaining portion is about ¼; less would do, but a smaller hole I fear could not be drilled so long. The advantage of having the top of the tube enlarged is twofold—1st, a much shorter portion is required to be ground accurate after boring—and 2dly, the indications in the glass or short limb are greater in the inverse proportion of that of the squares of the diameters of the two parts of the instrument.

It is essential that this enlarged portion of the tube be of uniform diameter or bore—this point must be ascertained before the top L be fixed on. The instrument is to be held perpendicularly, the stop cock K which cuts off the communication between the two limbs being closed, and the glass limb properly and tightly fixed on, mercury is poured into both limbs. Into the shorter as much mercury is introduced as will bring the top of it within the range of the scale. The longer one is to be filled within a line or two of the top. In this a float carrying a vernier is to be introduced, near the vernier a scale of inches and parts of an inch. This arrangement being made, the stop cock is turned so as to allow a certain quantity of mercury to flow from the longer into the shorter limb. The descent of the float in the former ought to have a certain proportion to the length of that in the shorter limb—the proportion as above stated being inversely as the square of the diameters.

If this proportion (which by means of the respective scales and verniers can easily be known, to $\frac{1}{100}$ of an inch) hold good, the upper part M is perfect as to bore. The lid L is now to be fastened on airtight—it is primarily, however, ground to fit exactly, and has a shoulder all round, corresponding to one on the top of the tube. Moreover it enters this a short way, the exact distance being marked outside by a line or dot.

The brass tube E D has a slit on opposite sides, and extending its whole length—the magnesian cement beneath being removed, the fluctuations of the mercury in the glass tube are seen. The usual scale of inches is affixed to this tube, either on a separate piece of brass, which can be moved to admit of adjustment, or engraved on the tube itself. The vernier G F can be moved up and down the tube, or fixed at any part, by means of the screw G, after which it can be brought to cut the height of the mercury exactly by means of the tangent screw L.

The instrument is now ready to be filled with mercury. The glass limb is first to be removed, then the plug of the stopcock K. Mercury is now poured into the long limb until this is half full, when the whole is placed in a sand bath and the mercury made to boil. When this is effected, more mercury is poured in until the long limb is filled, when the plug K is replaced—turned so as to prevent the escape of mercury, of which the short portion C is next filled and a small funnel, represented by the dotted lines, fixed on the aperture, so that the mouth will be uppermost when the long limb is placed lowermost in the sand bath to which the whole is conveyed, and the mercury boiled, K being previously opened. When cold, the stopcock is turned to cut off communication—the funnel removed, and the glass limb applied. Mercury

Fig. 4.

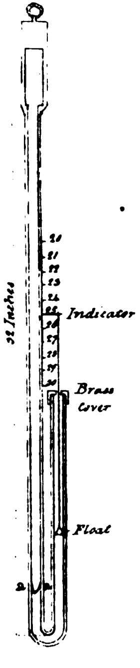


Fig 3.

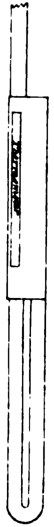
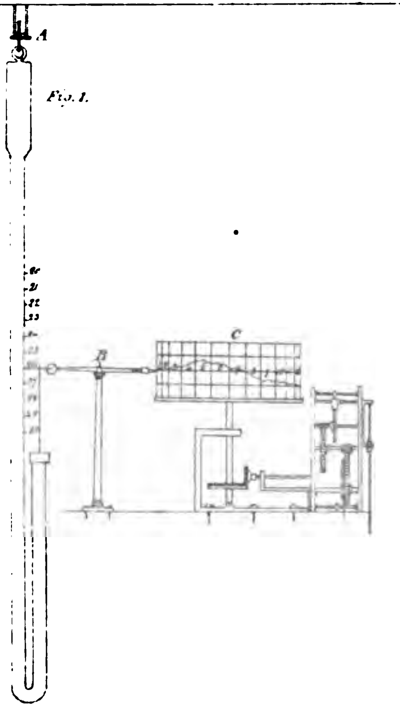


Fig. 2.

Fig. 1.



Scale [illegible] Inches

is now poured into this, to stand at the commencement of the scale, or 31 inches. The stopcock being opened puts the instrument in action.

The brass tube surrounding the glass one, forming the short limb, will be a great security to the latter. Nevertheless it would be an advantage to have one or two to apply in the event of accidents.

Fig. 3 is the above form of barometer converted into a self-registering one. The shape of the metallic tube, it will be observed, is the same as in the former one. In place of the glass or short limb, there are two rods A, only one of which is seen. The diameter of the upper portion of the long limb C is two inches—that of B half an inch. In this latter is a float, so constructed that the part immersed in the mercury is of the same specific gravity with that metal, while the part above the surface is as light as possible. The object of this is that when the barometrical column is falling, the light portion of the float will be pushed, as it were, before the mercury; while during descent the heavy portion will be carried along with that fluid. The pencil D is carried on the top of the rod being pressed gently against the register roller E, which, corresponding with X in the balance self-registering barometer, need not be again described. One of the pencil guides is graduated, and the pencil rod furnished with a vernier, so that, the height of the mercurial column being thus ascertained, the pencil is set at zero—as already explained.

V.—*Explanation of the Sketch of a New Indestructible Portable Mountain Barometer.—By* Captain George Underwood, *of the Madras Engineers.*

The tube represented in the sketch is intended to be precisely the same as the glass one used in Gay Lussac's, but constructed of iron, and of the dimensions attached. The projections below marked *a a*, indicate an inverted cone in the tube, to prevent air rising to the vacuum, and also to check the motion of the mercury while travelling. A thin rod of iron, with tight stoppers at each end, is inserted in the short tube while moving, and a brass cap fixed on the top effectually prevents the loss of any mercury. On the surface of the mercury in the short leg, floats a very light wafer of cork, to which is attached a straight upright wire, with an indicator at the upper end, moving along a scale, each division of which is equal to 4-5th of an inch, the cistern at the end of the long tube being four times the capacity of the short leg. The wire moves through a small hole in a brass cap, screwed on the upper end of the short tube, and which hole will also serve to give

access to the atmosphere to exert its pressure on the mercurial column. It is evident that any fluctuations in the height of the columns of mercury will be immediately communicated to the indicator, either by the float being pushed up if the mercury rise in the short tube, or by its sinking down when it falls. The scale, it is unnecessary to observe, must be graduated downwards, and a properly marked vernier attached. To protect the indicator, scale and attached thermometer, &c. a thin cylinder of brass is fitted round the barometer, as explained in the sketch. Two vertical openings are cut in this, which when the brass cylinder is properly adjusted render the scale and thermometer visible; the indicating wire is thus preserved from wind and accident. The scale here marked allows for a range of ten inches, which is considered sufficient, being equivalent to a difference of level of more than 11,600 feet. For particular purposes, however, this may be easily extended. When packed for travelling, the float and its indicator can be nicely fitted into the brass cover before mentioned, and more than one of these should be kept for use. The diameter of the bore being half an inch, with a cistern at top of one-inch diameter, and three inches long, about five lbs. of mercury will be required to fill it, the weight of the iron tube, and other apparatus connected with this barometer, may probably be about 4½ lbs. more; thus the total weight will be under 10 lbs.

EXPLANATION OF THE FIGURES.

Fig. 1.—*Self-Registering Apparatus.*—A—is the screw for adjusting the height of the instrument relative to the clock work; by this it can be raised or lowered at pleasure.—B—a leveller nicely balanced on a knife-edge centre, with a circular ring at one end, to embrace the indicator of the float; at the other end is an ever pointed pencil on Mordan's principle, with a small spiral spring within, which keeps it continually pressed against the revolving barrel.—C—The revolving barrel which may carry covers of paper, ass' skin, ivory, &c. The vertical lines represent the hours and minutes; the horizontal lines are inches divided into the usual number of parts. A fresh cover is fixed on every 24 hours, by stopping the machinery and adjusting it to any particular moment, on attaining which by a watch the machinery is started.

Great wheel 120—Second wheel 120, pinion 10 – Pallet wheel 90, pinion 6—Motion wheels 30 and 60—Circumference of barrel 24 inches—one revolution in 24 hours.

Fig. 2.—Front view, shewing the brass cover intended to screen the indicating wire from the wind. This cover is moveable round the barometer, and the opening here discloses the scale, which can be easily read off. When travelling this brass cover is moved round so as to protect entirely the scale Thermometer and the wafer with its indicator.

Fig. 3.—Side view—The opening here in the brass cover (adjusted as above to disclose the scale) exposes the Thermometer attached to the Barometer.

Fig. 4.—Tube of thin iron about 1-8th of an inch thick, total length out and out 34 1-8th inches; the shaded part represents the column of mercury.

VI.—*Suggestions for a New Standard for Indian Weights and Measures.*

TO THE EDITOR OF THE MADRAS JOURNAL OF LITERATURE AND SCIENCE.

Sir,—As the attention of Government seems to be particularly directed to whatever may benefit commerce in India, it is probable that the important advantages likely to result from an assimilation of weights and measures, as well as of coinage, throughout this country, will not be disregarded much longer.

Before standards are fixed, no trouble should be spared in considering the subject in all its bearings; in order that the most convenient possible may be decided on. The more, therefore, it is discussed the better, and, though the following observations may contain nothing new, or the views expressed in them may be incorrect, they may be useful as likely to elicit more valuable remarks, and, on that account, worthy a place in your Journal.

I am, Sir, yours very obediently,

B.

The inconvenience which must follow a change, that may affect every purchase throughout the country, must necessarily be considerable. But, is not the present system, which obliges every merchant, every one who buys or sells, to change his calculation of weights and measures, whenever he changes his residence from one country to another, or, frequently, from one village to another, productive of as great, or even greater, inconvenience, than will be caused by the one change resulting from the Government adopting and enforcing a new standard? Will it not eventually become necessary to adopt one, when the trade of the country is in that flourishing condition, in which the rulers of the country, as well as most others, wish to see it? And is it not desirable, therefore, that it be introduced now, when with less commerce there will be less inconvenience? In England, within a very few years, the measures of liquids and grain have been assimilated; yet very little has been heard of the inconvenience, even in that commercial country; and the advantages of the new decimal system in France have, long ere this, compensated for the temporary disadvantages and inconvenience that attended its introduction.

The native unit of measure in the Tamul country is the grain of paddy in the husk—1,800 grains of this make one *álákoo*, or *olluck*, eight of which form a measure, *puddi*, *nári* or *seer*: the weight of this quantity of paddy being the unit of weight. Whatever difference there may be in the measures in use in different villages, this is the table of measure taught the children in Tamul schools with their alphabet; and, it is probable, was the universal one, when the country was under one Hindoo government, if it ever were so. The proportions of the measures vary but little, and although the *marcal* or *koorooni* may be

of different size, the *puddi*, or measure, at the same place is almost always the same aliquot part of it.

The standard of length in Malayalum is a small seed called in the language of that country *yevun;* but, excepting there, the English yard, foot and inch are in general use among the natives of this Presidency. The acre is completely introduced in the Salem district, and the Madras *cawny** is in general use in the measurement of rice fields in every district of the Presidency, notwithstanding the original land measures were as various as the weights or measures of grain. These alterations have taken place quietly and gradually, and show that similar changes may be effected without extreme inconvenience.

The pendulum is a standard of length not easily to be brought into common use in India; but the newly coined rupee is a measure of length and weight furnished and certified by government, easily applicable, constantly at hand—(although not in the abundance one might desire, yet generally sufficient for the verification of weights, &c.)—not liable to vary in dimension, and depending upon the accurate and absolutely unchangeable standards of measurement established in Europe. It is probable that this use of the coin may have been thought of, when its diameter was fixed at one tenth of a foot. It would have been more convenient, had it been made exactly, probably, one inch, and had the ends of the diameter been marked by larger dots in the milling; in which way the subdivisions of the inch into eighths or tenths might also have been shown.†

The pagoda and rupee have been occasionally referred to, in fixing the weights in use at Calcutta and Madras. I would propose the latter as the universal standard; changing not the names but the quantity of the measures and weights at present in use. In lieu of making the relation of the measures to weights depend upon paddy, I would have it depend upon water, as less variable and the principal change would be fixing the *pullum* weight universally at 3 rupees weight = 540 grains, instead of at 10 pagodas weight = 547 grains.

* The Madras *cawny* is a more convenient measure than the English acre. It is an exact square of 240 feet sides; very nearly half a circle of 400 yards circumference, and since it contains 6,400 yards square, is divisible into 16 or 320 parts without remainder. The advantage of this is evident when it is considered that the Tamul fractions have always 320 its multiple or measure for denominator, and that the fractions in use among other natives of India are in like manner measures or multiples of 16. In this Presidency, too, the *cawny* is already more generally known.

† It is questionable, also, whether the gratuitous information contained in the words on the reverse "*one rupee*" and "*yek roopaee*" might not be advantageously replaced with something else.

Coins themselves might be made vehicles of useful information. Their relation to one another, and their weight and measurement, might all be stamped on them. I do not see why the English digits and alphabet might not be inscribed on the reverse of the copper and silver coin, &c. The moralist would be pleased to see knowledge and riches thus go together!

The following table shews the alteration that this would effect in the Maund *and* Candy, *as well as other particulars.*

Weight in Rupees.		Proposed weight. Grains.	Old weight. Grains.	New weight, less in lbs. and grains avoirdupois.
3	1 Pullum............	540	547	7 grs.
24	{ 1 Small seer 40 to a maund }	4320	4375	55 ,,
75	Seer of 25 pullum	13500	13672	172 ,,
120	1 Viss of 40 do.	3 lbs. 600 grs.	3 lbs. 875 grs.	275 ,,
960	1 Maund............	24 lbs. 4800 ,,	25 lbs.	2200 ,,
19,200	1 Candy...	493 lbs. 5000 ,,	500 lbs. *	6 lbs. 2000 ,,
3,000	1 Maund(Bengal)	77 lbs. 1000 ,,	80 lbs.	2 lbs. 6000 ,,

Water.

1 Alakoo=...............	Rs. 18
1 puddi = 54 *f.* oz. weighs...............	144
1 Marcal = ...	1152
1 Garce = ...	4,60,800

Paddy.

1 Alakoo...... ...	Rs. 14	A. 1
1 Puddi weighs	112	8
1 Marcal	960	0
1 Garce......	3,60,000	0

Were these adopted, the measures at Madras might remain the same, and the weights would be altered so little that I apprehend trifling inconvenience would be felt there.

There would be, perhaps, some disadvantage in the weights not remaining equal to even numbers of pounds English. The rupee † is not an even measure of the avoirdupois pound of 7,000 grains, and, without relinquishing it as a standard, it appears to me that this cannot be effected.

The weight of the 4 pice piece $\frac{1}{16}$ of a rupee, is about $134\frac{1}{4}$ grains ;‡ a weight, however, less convenient than that of the rupee as regards English measures.

Should a decimal system be introduced, coins as well as weights must be altered. The unit might then conveniently be the English pound sterling; the rupee being one tenth, and smaller coins, tenths and hundredths of it, the latter very nearly corresponding with the English farthing. The foot would be the unit of length, the rupee's diameter being one tenth. The weight of one pound sterling, or ten rupees in silver, might be the unit of weight, and the quantity of water weighing ten rupees the unit of quantity. The advantage of the decimal system,

* It may be remarked that the *Candy* being fixed at 500 lbs. English, and the *Maunds* at 25 lbs. and 80 lbs. shew European alteration already effected.

† The Company's rupee weighs 180 grains, or 3 drams apothecaries weight ; 32 rupees weigh one pound apothecaries or troy weight ;—350 rupees weigh 9 pounds avoirdupois weight. A cubic foot of water weighs 1,000 ounces avoirdupois, or 437,500 grains, or 2,430 $\frac{5}{9}$ Rupees.

It is much to be regretted that the Commissioners in England should have preserved the two different pounds weight, or at least that they should not have made the troy pound and avoirdupois pound to bear a more convenient proportion to one another than 5,760 to 7000.

‡ If the alloy of the rupee is copper, the value of that metal appears to be $\frac{1}{39}$th part of that of silver—and the rupee worth 6,450 grains of copper nearly.

and the convenience arising from its facility of arithmetical reduction, would not be felt so immediately by the native community to whom generally the decimal fractions * are unknown. For them the continued division by 4 would be more convenient, as it is that to which they are accustomed, and to which their notation is adapted. It also should not escape remark that the proportions of weights, &c. however arbitrary they may seem, have doubtless been regulated by convenience, and relatively to the value, the size of the packages, and the methods of transporting the articles weighed or measured.

VII.—*On the Induration of Mortar.*

The paper on this subject in the April number of the Journal, has recalled my attention to an enquiry which formerly much interested me, and its general usefulness will be my excuse for offering the following observations on it.

The strength of cements may be compared by attaching bricks to a wall of the same material, added one by one (each being allowed to dry before a second is applied) until by the weight the cohesion of the cement is overpowered, and the mass breaks off from the wall. In the 285th page of Barlow's 'Essay on the strength and stress of Timber' some experiments made by J. Brunel, Esq. in this manner are mentioned; and, by comparison with these, the relative cohesion of Indian and British cements may be ascertained.

The use of sugar *(jaggry)* in the preparation of cements is attributed to two causes; its being partly composed of carbon and oxygen, and

* India in bestowing the decimal arithmetic upon Europe seems to have forgotten it herself. At least the Mahrattas, Canarese, Malialies, Telingas, and Tamulians as well as the Musulmans, make use of different fractional systems, while the notation of the Tamulians and Malialies, is very defective, compared with the rest, the digits not deriving value from position, so that thirteen of them are required to represent the number 2,234,567.

The publishers of books in the native languages would have done well to have made use only of English numerals and notation, which would have assisted their introduction throughout India.

Since the forms of 5 of the 10 digits are the same in English, Mahratta, Sanscrit, Canarese and Teloogoo, there can be little doubt that an order that the English notation only should be used in Cutcherries after the 1st of January 1837, would be easily obeyed, and it may be remarked that were the English figures used, it would be easy for the European officers themselves to examine and correct accounts without translation, and that the copying of them might be saved by having the headings written in the native languages, and those translated in English. Considering how voluminous accounts are, the saving of stationery and writers' labour would not be so trifling as to be unworthy of consideration.

The European vulgar fractions are infinitely more convenient than those of the natives, both Hindoos and Mahomedans, which, among other objections, admit only of a limited number of denominators.

consequently able to afford carbonic acid to assist in the conversion of the hydrate of lime into carbonate, and the property that substance has of, in a peculiar manner, facilitating the solution of the alkaline earths in water.

With regard to the *jaggry* supplying carbonic acid to the mortar, I have made the following calculation, shewing that, in order to give sufficient carbon, 48 parts of sugar must be mixed with every 100 of unslaked lime. But, as the quantity used is but one lb. to 288 lbs. of slaked lime, it appears improbable that the *jaggry*, if useful, is so on this account.

4.68 parts of hydrate of lime contain	To which add 1.73 parts of sugar containing		There will result
3.56	Lime..........	0	3.56 lime.
.94	Oxygen........	.801	1.741 oxygen.
.185	Hydrogen......	.179	.75 carbon.
	Carbon........	.75	.364 hydrogen.

To which, if .259 of oxygen, obtained from the water or air, be added, there will be oxygen and carbon in the due proportion to make 2.74 of carbonic acid; which, with 3.56 lime, will form 6.30 carbonate of lime. Now 3.56 : 1.73 : : 100 : 48.

It must be particularly noticed that, in order that the mortar should harden, it is not merely necessary that the lime should be thoroughly carbonated. Common chalk and shells are as completely carbonate of lime, as are the calcarious spar or marble; yet the hardness of the former substances is very inferior to that of the latter.

The hardness of the mortar probably depends upon crystallization. A writer, quoted in the Encyclopædia Britannica, says, that the lime crystallizes and entangles the sand in its crystals. Now, in order that crystallization may be effected, it is requisite that the crystallizable matter be dissolved, in the first instance—and the *jaggry*, in assisting the solution, probably assists crystallization. The use of lime water—*i. e.* a crystallizable solution of lime in water, instead of common water, has, I know, been practised by the Madras engineers at Nagpore, if not elsewhere, and with good effect. Water dissolves but 1-450th part of lime, but the addition of sugar would enable it to dissolve a larger quantity, in proportion as a larger quantity of sugar was employed.

It appears to me probable, therefore, that it would be found a good method to use, instead of a solution of *jaggry* in water, as is the present practice of the bricklayers in this country, a solution of *jaggry* in water, which should afterwards be saturated with lime, and then made use of to moisten the mortar, when the brickwork is being built. There would thus be used, in an early stage of the building, water holding a quantity of the lime in a crystallizable state, which,

as I have found from experiment, would rapidly deposit crystallised carbonate of lime and assist the mortar in hardening. The deposit takes place even under water, shewing, perhaps, a property necessary in water cements.

In Spain, and in some parts of this country, a mixture of chunam and fish oil is used for the purpose of defending the bottom of vessels, to save the expense of coppering them. This composition gets soon covered with sea-shells, and it is necessary to chip it off and replace it every now and then. When first applied, it is soft as putty, but in the course of a fortnight it hardens, and after some time becomes so hard that it is cut with a heavy axe with great difficulty. It appears likely that this would be found a very useful water cement, especially with sea water, and, as it is not likely to make any great difference with what description of oil it is made, a cheap one, too.

I am not chemist enough to answer the question whether the sugar and the oil act upon lime after being changed into a state analogous to oxalic acid. It may be useful to remark that the three substances are composed of the same elements, and not in very different quantities, and that oxalic acid is that which has the strongest affinity for lime as well as for magnesia.

The quantity of lime that should be mixed with sand, in order to produce the strongest mortar, has been frequently discussed, and very various indeed have the results of these discussions proved—as, indeed, might have been expected from experiments which do not appear to have been carried on in the same manner. The first paragraph of these remarks shews a good and easy method of trying the cohesion experimentally. Theoretically, it may be considered that all that is not brick or stone in a building must be mortar, in order that it should be one solid mass. In like manner, it may be considered that all that is not sand in a quantity of mixed mortar which has dried should be crabonate of lime. Now, if you take a tumbler, and fill it with dry sand, you may afterwards pour into it without spilling rather more than half as much water (by measure) as you put sand: consequently the sand does not *fill* half the space that it occupies. Hence it would appear that mortar should consist by measure of equal quantities of carbonate of lime and of sand—or further, that, since 630 parts of carbonate of lime contain 356 of lime, that the proportion should be 356 parts of lime (or 468 parts of hydrated, or slaked, lime) to 630 parts of sand—which is nearly in the proportion of two to three. It is to be remarked that if coarse sand be mixed with fine a larger part of the space occupied will be filled; and also, that this proportion of two to three is that in use among *maistries* in this country.

With regard to the quantity of mortar that should be used with bricks, this must depend on the closeness and goodness of the work. If 1,000

bricks of the regulation size (the thickness of which, by the bye, is too great for the native method of burning bricks) be allowed to 66 cubic feet, and 100 bricks are deducted for breakage loss by carriage, &c. the remaining 900 will fill 47¼ feet, and 18¾ remain to be filled by mortar; or as a *parrah* measures 2⅛ feet, about 6 *parrahs* and a half—so that 2⅓ *parrahs* of slaked lime, 3⅞ *parrahs* of sand, and 900 bricks, appear to be a just proportion. B.

VIII.—*On the Homöothermal method of Acclimating Extra-Tropical Plants within the Tropics.*—*By* Robert Wight, Esq. M. D. &c. &c.

TO THE EDITOR OF THE MADRAS JOURNAL.

Dear Sir,—Believing the views, propounded in the accompanying observations on the acclimating of extra-tropical plants in tropical climates, of much importance to this country, I am very desirous of having them speedily subjected to the only test that can determine their value—carefully conducted experiment—both in India and Europe: you will therefore much oblige me by giving them a place in the forthcoming number of the *Madras Journal.* Early publicity is desirable, because it is to the philosophers of Europe (enjoying as they do unrivalled facilities for conducting the enquiry, as well by the juxtaposition of two climates, as by their skill in performing experiments) that we must look for the final determination of the truth or fallacy of my deductions from the few facts already ascertained. As the paper was originally written while encamped on the Pulney mountains, separated alike from books and every collateral source of information, I do not hold myself responsible for having overlooked the works of other labourers in the same field, if such there be, for truly I know of none. The principles have long been public property, but their application, in the manner here proposed, has never, I believe, been recommended by any one.

I remain, dear Sir,
Yours, &c.
Robert Wight.

Salem: 24*th November,* 1836.

Numerous analogies between vegetable and animal life have been observed and dwelt upon, by nearly all writers on vegetable physiology. This knowledge has, however, been but little applied to the advancement of horticulture, and not at all to that of agriculture; so far at least as I yet know: and I think I may with safety assert, that it has never till now been proposed, so to act upon the principle which governs the functions of vegetable life, as to alter entirely the constitution of the plant, and thereby qualify it, though originally from a cold or temperate climate, to endure, uninjured, the extreme heats of the tropics. To produce this change is the object of the Homöothermal method of acclimatizing plants: to point out how it may be accomplished, is the purpose of my present communication.

The effect of cold in preparing plants for forcing, has been long known, and is now constantly employed for that purpose, but the application of heat to seeds during the act of germination, as meaans of enabling them afterwards to resist, uninjured, high temperatures, has never been had recourse to on principle, and but seldom as a chance experiment. Two such experiments, however, have been recently recorded in the Transactions of the Agricultural and Horticultural Society of India.* These I shall briefly recapitulate, and then explain the principles on which their respective results may be accounted for, and lastly show their application to the improvement of agriculture, and the acclimating of foreign plants. The following extract, from a report of a Committee of the Society of Arts, explains the successive steps of the first of these experiments, conducted by Mr. Anderson, Curator of the Chelsea botanic garden, for the introduction of Joomla rice (a very hardy plant) into England. He was furnished with some seeds of five varieties of hill rice. "They were sown in March, and some of each kind germinated, and did very well while they were kept in the hot-house. In May they were removed to the green-house, where they became stout and healthy plants. In the end of June, they were transferred to a sheltered place in a bason for the growth of aquatic plants, having 9 inches depth of water, and 12 of mud. Here they grew and promised well till the beginning of August, when the weather becoming cloudy and rather cold, they became sickly, and were all dead by the beginning of September, without having come into flower. It seems therefore evident, that the temperature even of the warmer parts of England is not sufficient for the cultivation of hill rice."

The second was made by G. T. F. Speed, Esq. of Calcutta. He "after repeated and disheartening failures with celery and some other English seeds, at last resorted to the plan, almost unthought of in India, of making a hot bed." In this he sowed his seed on the 24th

* Vide vol. 3 pages 88 and 89—103, 101 and 119,

November. On the 4th December they germinated, and on the 10th of January he planted them out in trenches. During the time they were in the bed he daily moistened them with water that had been exposed for several hours to the heat of the sun: and, on the 11th May, a bundle of red celery, sent to the Society with his communication, is recorded "*very fine* considering the late season of growth."

Can the opposite results of these experiments be referred to any fixed principle, governed by the laws of organic life, which, if discovered, could be successfully applied to the introduction of foreign plants into tropical climates?

I think they can, but, to explain the principle, I must seek the aid of animal physiology, from the laws of vitality being better understood, and more cognizable by the senses, in animals than in vegetables.

Animals are endowed with a principle of life, only known to us by its effects, but the laws of which have been carefully studied. It has received the name of Excitability or Irritability (I prefer the former term) from its property of being acted on, and excited, by the application of external agents: the agents are called stimulants; and the action excitement. Excitability increases in proportion as we reduce excitement by the abstraction of stimuli, and diminishes with their application: hence a person famished with hunger has his excitability so increased, that the stimulus of the mildest food induces violent excitement, and a person frozen will, from the same cause, be destroyed by heat of a moderately warm room. On the other hand, a person in the habit of maintaining considerable excitement by the habitual use of stimulants, cannot bear their privation so well or for so long a time as one habitually temperate; nor does the same quantity of stimuli produce in each an equal degree of excitement; on the contrary, the quantity that would produce high fever and rapid exhaustion in the one, is barely sufficient to preserve health in the other. Excitement is the process by which excitability is reduced, and kept within the bounds consistent with the health and well being of the animal; and by the graduated use of stimulants, we can so modify the susceptibilities of this vital principle, that a considerable degree of stimulation becomes necessary for the maintenance of the organic actions, by which the functions of life, assimilation, circulation and transpiration, are carried on: or, by their abstraction we can raise the susceptibility so high that a slight stimulus will cause great excitement. Excitability is then equivalent to privation of stimuli, excitement to their excess. Excitability being high, a slight stimulus produces violent action, if low, strong stimulants produce little excitement. Let us now apply these principles of animal to vegetable life, and see whether they afford us a satisfactory solution of the question proposed, and prove the

identity of the vital principle which governs both animal and vegetable existence.

Mr. Anderson commenced his experiment, by changing, through the application of the stimulus of heat to the germinating seed, the character of his subjects, from hardy extra-tropical, to tender tropical plants, and then concludes, that they are naturally too tender to withstand the cold nights of an English autumn. Mr. Speed by the application of heat, at precisely the same stage of their existence, changes his from hardy to tropical plants, and then successfully rears them in a tropical climate. Both are surprised at the result, while in truth, on the principles here explained, the success of the one was as certain as the failure of the other. Had Mr. Anderson sown his seed in autumn, in the open air, as he would have done winter wheat, and as is done in their native country, their power of resisting the cold of its almost Siberian climate, would easily have protected them against the much milder winter of England; while their excitability, accumulated by the long privation of the stimulus of heat, would have prepared them to start vigorously on their course to maturity with the first heats of spring, and, in all probability, they would have matured their crop in the course of the summer or early in autumn. Mr. Speed having failed in rearing celery by adopting the contrary practice, with most commendable perseverance, determined to sprout his seeds in a hot bed, and is rewarded by the possession of a plot of fine celery in May. From this *it would appear*, that plants raised from European seeds, if germinated in cool shaded beds, retain in a high degree their excitability, unfitting them for successful culture in a hot climate; but which is exhausted by the application of heat to the germinating seed, and their constitutions so modified and assimilated to the climate, as not only to resist a high temperature, but even to render it necessary to their after existence.

Does the seed of plants so altered, retain the tropical character communicated to the parent?

In the present state of our knowledge it is impossible to answer this question, as not a single fact exists directly bearing on the subject: but, reasoning *a priori*, I can see no reason for doubting that they would in the second, if not in the first generation; and if numerous and carefully conducted experiments prove this to be the case, I have no hesitation in assuming, that the two experiments which form the basis of this communication, have led to the most important and valuable discovery ever made in the science of agriculture, in connection with vegetable physiology. It is almost superfluous to add, that the obvious deduction from them is, that we may, if we choose, see the plains of India, and not of India only, but of the whole torrid zone, covered with the highly nutritious grains and roots of Europe, in place of the very inferior ones now in use. Nor need we confine ourselves

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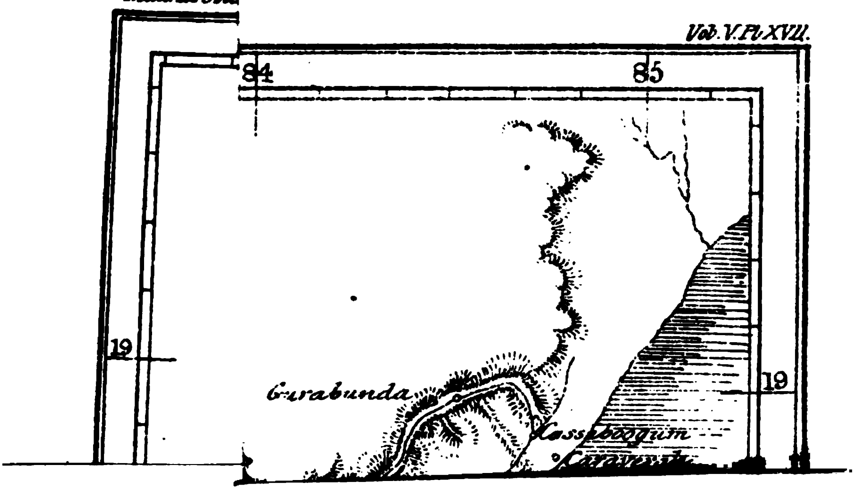

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to the introduction of the herbaceous forms only, but may, by applying the same principles to the arboreous vegetation of temperate climates, extend it to the tropics, thereby supplying ourselves, not only with the products of the farm and kitchen garden, but of the forest and orchard. On these grounds I cannot refrain from soliciting—urgently entreating—all those enjoying opportunities of making experiments, both in India and Europe, to unite in their endeavours to confirm by repeated trials the truth or fallacy of the principles I have deduced from the facts and analogies above stated.

IX.—*Notes, chiefly Geological, of a Journey through the Northern Circars in the year* 1835.—*By* P. M. Benza, Esq. M. D.

Sono, prima d' ogni altro, da compararsi i varii, e slegati fenomeni già posti, e raccolti dalla osservazione, e dall' esperienza, così ad uno ad uno, come tutti insieme; per vedere se che si convengano, o peravventura si differiscano.—*Scinà. Introd: alla Fisica Sperimentale.*

Masulipatam, *Jan.* 16, 1835.—We disembarked at this place from Calcutta, and proceeded to the camp, pitched about a mile from the place of debarkation. I felt distinctly that we were passing through an unhealthy, marshy situation, the atmosphere having the characteristic odour of such pestiferous places, arising from the putrefaction of the lacustrine plants the *salicorniæ* principally.

As we traversed the plain, we could not but wonder at the many human skulls scattered over it, having been, as we were told, dug up by jackals, and other animals from their untimely graves. They were those of the unfortunate people, who fell victims to the mortiferous epidemy, which, two years before, carried off a great many European soldiers, and multitudes of the natives.

Although the Right Honourable the Governor's camp was pitched some distance from the unhealthiest part of the plain, yet, the miasmatic effluvia, particularly at night, was powerfully felt. I never recollect the odour so strong, except in the swampy plains of the Acherusian lake (*hodie* Fanari), where, during the heat of the summer months, the exhalations from that vast swamp corrupt the air to such a degree, as to prove exceedingly baneful to the imprudent who ventures to sleep, even one single night, within the influence of these pestiferous exhalations. At Masulipatam, the two nights we slept there, the odour was very strongly developed.

The plain, round Masulipatam, is sandy, having a subtratum of clay. In this sand are found many pieces of a concretionary calcarious sandstone, generally speaking mammillary, such as we see in alluvial depo-

sits* of many places in Europe. This is the only locality, where I did not meet with the substance, so widely spread in the plains of India—the nodular kankar.

In the middle of the Pettah, at the spot where the two principal streets cross each other, are placed erect and arranged in a circular form, thirty-three large slabs of a compact limestone, covered with numerous figures in *basso* and *alto relievo*, of the most exquisite execution; excelling any in the few places I have visited in India, containing such relics of the remotest antiquity, the Seven Pagodas not excepted. The sculptures at Masulipatam, being cut in compact limestone, of a very fine texture, are susceptible of receiving a delicacy, a kind of mellowness in the execution of figures and friezes, which it is impossible to impart to the coarse grained pegmatitic rock of the Seven Pagodas. There is such anatomical correctness in the figures, and so much nature and freedom in their positions and attitudes, that Gaggino† himself would have been proud of acknowledging them as his work.

These sculptured slabs were brought from the ruins of a pagoda, seven miles from Masulipatam; and, by what I remarked in one of them, they must have belonged to a more ancient building, than the pagoda whence they were brought to Masulipatam. One of the largest slabs (more than four feet high) had one of the two surfaces, convex, the other, plane. On the convex one, were multitudes of figures, which covered its whole space, representing processions, sacrifices of animals, and other religious ceremonies, said to be those of the Jain tribe. On the back surface was sculptured a reversed column, the pedestal turned upwards, and the capital downwards; showing that the two faces of the stone had been sculptured and used at two different periods, and for two different buildings.‡

* Doctor MacCulloch describes calcarious concretions found in banks of sand in Perthshire, which "present a great variety of stalactitic forms generally more or less complicated, and often exceedingly intricate and strange, and which appear analogous to those of King George's Sound, and Seewers island." Quarterly Journal, (Royal Institution) Oct. 1833, vol. xiv. page 79—83.

† The celebrated Sicilian sculptor in *basso* and *alto relievo*,

‡ It is common to find sculptures on both sides of a slab, either as a friese, architrave, inscription, or other ornaments, in Greece. I discovered in the ruins of ancient Samos in Cephalonia (one of the provinces tributary once to Ulysses), opposite to Ithaca, two sepulchres; the one having on the external surface of the cover the following inscription in ancient Greek: DIONISIA VALE, (Plate 17. fig. I); and, descending into the sarcophagus, I saw, on the under surface of the same slab, some very old Greek letters, the remains of an inscription, which I could not decypher.

On the cover of the second tomb, externally, there was no sculpture, nor inscription of any kind; but, on turning it was seen, in very rude, and apparently very ancient, Greek characters, the following inscription: PHILOSTRATE ATTATE VALE, (Plate 17, fig. 2). In the island of Corfu (Phœacia, *olim*), at the summit of Capo Bianco (*olim* Leucimne) I found a tomb-stone with the following inscription: FULCENNIA FAUSTA, ANNORUM XX. VALE, (Plate 17, fig. 3). On the reverse of this slab there were arabesques, lines, &c. indicating that that side had been probably employed as an ornament in a more ancient building, before it was used as a tomb-stone.

Among the sculptures at Masulipatam there was a piece, apparently part of the entablature of an architrave, which was really in a very refined style; there were figures of lions, tigers, rhinoceroses, buffaloes and men, executed with so much taste, and so exquisitely correct, as to call forth the admiration of all who saw it.

This, and many others of the sculptures attracted the Right Honourable the Governor's attention, who on the spot gave orders for their transmission to a safer, cleaner and more conspicuous place.*

The limestone of these slabs is stratified, and has great similarity to that used for lithographic purposes (No. 1)—colour, yellowish gray—fracture, splintery and dull, occasionally glimmering—semi-transparent at the edges; in short, it resembles magnesian, or some species of the alpine, limestone. I was told that it is quarried on the banks of the Kistna river, near Chindapilly.

Goodoor, *January* 19.—The subtratum to the alluvial sand, in the plain between Masulipatam and this place, is blackish clay (No. 2), containing some fresh water shells, such as *ampullaria, planorbis,* &c. (No. 3). Just before reaching Poomroo the sandy alluvium is succeeded by the black cotton soil, in which I found also *ampullaria* and *planorbis.*

Wheyoor, *Jan.* 21.—Cultivation of all sorts of grains appears to prosper in the environs of Whehoor, and the black soil prevails, in which are found, even at one or two feet depth, under the surface, fresh water shells, of species now existing in tanks.

Bezoara, *Jan.* 22.—All the plain between Whehoor and this place has the usual uninteresting, monotonous appearance of the plains of India; but close to the village of Pattamotta, not three miles from Bezoara, we were relieved from this dispiriting sameness, by the sight of elevated land and hills. The knoll, at the foot of which the village stands, is hardly 40 feet above the plain; and another near it has somewhat less elevation. Both are formed of a variety of gneiss, which contains garnets instead of mica; although, in some blocks we see this last mineral not only added to the other three, but sometimes predominating over them (No. 4). We shall see, hereafter, that, in the whole province, this is the predominant rock; the quartz of which has a gray colour, the felspar white, with the appearance and nature of albite; the garnets, generally amorphous, but occasionally crystalline, and of the common colour.

* They have not yet reached their destination, the Museum of the Literary Society.

The different colours of the minerals give to the rock a fine appearance. The direction of the strata in these hillocks is N. and S. dipping east, and, as far as could be judged at that distance (3 miles), the hills west of these last are formed of the same rock, the direction and the dip of the strata being the same as of the eminences near Pottamotta. This species of gneiss seems to decompose easily, the albite being the mineral to decay first. Many blocks, both loose and fixed in the soil, are seen between Pottamotta and Bezoara. This last town is situated close to the left bank of the Kistna, at the eastern side of the hill, whose western base, is washed by the river during the freshes. Two ranges of hills, having the same direction, viz., N and S., confine the river in a kind of gorge; the one to the north, the other to the south, and therefore running in a direction at right angles with the course of the river. The height of both these ridges seems to be the same, about 600 feet above the river.

The water in the Kistna at this season is hardly one-third of the breadth of the river during the monsoon; but during the freshes the waters expand, filling the whole breadth of the bed, reaching the foot of both ranges of hills; and then the stream must be at least a mile and a half broad. It appeared to me that, both above this gap of the hills, through which the river runs, and below it, the country is flat, and nearly on the same level; therefore, what I have read in some publication, of the waters of the river having cut through this chain of hills, does not appear very probable.

In the alluvium, many strata of which are seen on both banks in an horizontal position, are composed of a coarse sand, alternating with those of a greyish clay (No. 5). The rock forming the hill, at the eastern foot of which Bezoara stands, is the gneiss I have just described, the strata being very much distorted and inclined, dipping south. It is not rare to see entire strata formed exclusively either of quartz, or felspar, or hornblende rock, which last lies, dyke-like, among the gneiss.

The direction of the strata is N. E. and S. W. nearly perpendicular to the course of the river, which at this place runs N. W. and S. E. Gneiss is the lowest visible rock about Bezoara, the contortions of the strata of which are well displayed in the sections of the new road at the base of the hill to the left.

GUNNAWARUM, *Jan.* 23.—Early in the morning we passed over a ridge, the continuation of the Bezoara hill, running eastwardly; it was still dark, so I could not distinguish the nature of the stone composing it; but some specimens I picked up in the road, proved to be garnetic gneiss, analogous to that of Bezoara. The plain near this place displays hardly any blocks of stone, either loose or implanted in the soil, except near

a deep nullah, where are many masses of quartz-rock, which must have been brought from the distant high hills to the north, and accumulated there for the purpose of building a bridge; the few projecting rocks are the usual garnetic gneiss, often decomposing, the garnets assuming a cancelated structure (No. 6).

This gneiss, like all primitive Indian rocks, whether stratified, or massive, contains immense beds, or veins, of quartz. When the other minerals decompose and are removed, the quartz must protrude, and, deprived of support, split into fissures, the pieces being scattered in the plain; or, if the rock be in the declivity of a hill, it is hurled down into the ravines and valleys. In one place, to the right of the road, there is a little elevation of sandstone, with a few blocks projecting at the summit (No. 7) which sometimes assume the conglomerate structure, resembling clay prophyry (No. 8), or conglomerate sandstone (No. 9); over the whole plain, pebbles of quartz and of sandstone are very abundant.

APPOORAPET, *Jan.* 24.—The Right Honourable the Governor having resolved to stay here for the remainder of this, and all the following day, I did not miss the opportunity of examining the diamond mines, which the Honourable Mr. Russell informed me were only six miles north of this place.

Having made my arrangements for the journey, a tent accompanying me, I started at 5 o'clock next morning in a palanquin. After about three miles having traversed a plain of some extent, near the village of Shingoonoosoondum, the guide, who had assured me, with an oath, that he knew the place, began to talk with every person he met, *sotto voce;* which led me to suspect he was ignorant of the place we were going to. Fortunately, meeting a man who understood Hindostanee, and having the memorandum, with which Mr. Russell kindly provided me, of the name of the village close to the mines, I asked for Mullavelly, and immediately the man pointed out a tuft of lofty trees, in the middle of which were seen the huts of the village, I was in search of. He took me, at my request, to the headman of the village who conducted me to the pits, answering, with a captivating affability, all the questions I put to him in our way to the excavations.

The road from Appoorapet to Mullavelly, lies along a sandy plain, which, I am told, is swampy during the heavy rains. Approaching the last mentioned village the plain is bestrewed with blocks and fragments of a very hard conglomerate sandstone, some pieces being of a purplish colour (No. 13). There are also some large blocks of garnetic gneiss, in a state of decomposition (No. 14). But the red sandstone abounds most, although rolled pieces of quartz, with a covering of a ferruginous clay, or carbonate of iron, together with the conglomerate sandstone, are scattered over the plain.

The hollow flat, where the diamond pits are excavated, was a low swampy plain, at the season I visited them, the lower part only containing some water. Being surrounded by a bank, or rising of the soil in a circular manner, it has the appearance of having been once a lake. The banks are formed of the red ferruginous sandy soil, prevailing all round this place; through this plain no river or rivulet flows, and the pools in its lower part dry up about the month of March; and it is then the time when the excavations may be commenced, and not before.

The few hills I could see near this place were those to the north, not above two or three hundred feet above the plain, and covered with underwood, interspersed with large trees. Some miles beyond these hillocks runs another range of hills, loftier than the nearest ones, having, however, the same direction.

The diamond pits are in general excavated at the north end of the bank that surrounds the hollow. Judging from some which were dry, the deepest could not be more than 12 feet; and I observed that, whatever their depth was, they never came to a hard mass of rock. The strata which they penetrate during the search are—first, a grey, clayey, vegetable mould, about a foot or two thick; below this an alluvium, composed of the following pebbles, (not including the diamonds) which have evidently undergone attrition, their angles having been worn off: sandstone similar, to the one already described—quartz—siliceous iron—hornstone—carbonate of iron—felspar—conglomerate sandstone, and a prodigious quantity of kankar, or concretionary limestone (No. 15). Of this last mentioned rock, we must say a little more than of the others; the reason is obvious—namely, that the gem is the base of the acid in the calcarious stone.

Besides the numerous pieces of this concretionary rock, scattered on the surface of the soil, and also intermixed in large quantities in the diamond alluvium, it forms regular strata, or veins we might call them, in a horizontal position, both in the vegetable earth, and in the diamond alluvium, precisely like flints in chalk. Many of the pebbles of quartz, and hornstone are not only varnished, as it were, with a ferruginous *enduit*, but it penetrates into their substance. This kankar contains not a trace of quartz or any other mineral; and that in strata, in the vegetable soil and in the diamond alluvium, is more friable than that exposed on the surface of the ground.

It is in this alluvial detritus that the diamonds are found; my specimens were taken from a heap, on the brim of the last excavation, made five years ago. From this refuse, the headman told me, were obtained, as many small pieces of the gem, as might fill, the hollow of the palm of the hand; no other excavation has taken place since.

All the pits are of an irregular form; generally, oblong; the head-

man told me they were not more than ten feet deep; this I could not ascertain, on account of the water, with which they were partly filled.

The headman, who appeared an intelligent, obliging person, gave me the following information, in reply to my interrogatories; he always presides over the excavations, whether the pits are farmed, or are worked on account of the Nizam. The diamond is never found imbedded, or, in any way, attached to any of the pebbles, with which they are invariably associated in this locality. They are always found loose, mixed with the other little stones. On my particularly pointing out the kankar, he said the gem was never attached to that substance. On enquiring, which were the pebbles most constantly associated with, and forming infallible indications of the existence of, the diamond; he picked up from the heaps of detritus, the following pebbles—iron ore, hornstone and the kankar.

Notwithstanding the prodigious quantity of carbonate of lime in this locality, the water did not appear to contain any traces of it; and the inhabitants used even that collected in the pits.

The detritus, forming the diamond stratum, must have proceeded from the hills north, the only ones near this place; being probably the continuation of the sandstone range, which extends eastwardly from Banganapilly, Condapilly and Mullavelly, in all of which localities the matrix of the diamond is a conglomerate sandstone.

Ellore, *Jan.* 26.—This place is more celebrated for handsome women, and fine, muscular, well proportioned men, than any other in the peninsula. And indeed, among the numerous persons both young and old, who crowded along the road to see the Governor pass, I did not perceive one who could be called ugly, or who was sickly in appearance, filthy, or in ragged attire.

The Native regiment in the garrison (of course recruited from different parts of India) had suffered severely this year (1835) from pernicious intermittent and remittent fevers, the inhabitants having had likewise their share of the mortiferous scourge. Dr. Davison, a very able, well informed, zealous professional man, told me that the proximate cause of this epidemy, was, both in the last and present year, the profuse rains, which, whenever exorbitant, never failed to impart to the exhalations from the rice fields a deleterious influence, that proves very baneful to the human system. The same happens in the south of Italy, where, if on account of profuse rains, or ill-managed irrigation, the rice fields be overflown, a burning sun succeeding to them, the air in their vicinity becomes pestiferous, and very dangerous, to the cultivators particularly. We were informed, that out of five hundred men of the regiment, one hundred were in hospital; and although the disease had then abated in severity, yet many of the con-

valescents had engorgement of the spleen, or other abdominal viscera, which eventually terminate in dropsy, berriberri, or other *sequelæ*, most of which prove incurable, and at last end fatally. The condition in which the Governor found the hospital, although unavoidably crowded, gave great satisfaction, and did credit to Dr. Davison's zeal and exertions.

NULLACHERLA, *Jan.* 28.—The plain, which surrounds Nullacherla for some miles, is covered with a sandy soil, overspread with numerous pieces and blocks of sandstone. The grains of quartz, in this last mentioned stone, are cemented by a ferruginous paste, which gives to the rock a deep red, or purple, colour; the loose pieces apparently have undergone long attrition, being rounded, or at least their angles very much blunted. In many places there are blocks of the same rock jutting many feet above the soil, and evidently impacted deeply in it.

In these last mentioned rocks the stratification is quite evident (No. 16), and in many pieces the iron is in such a quantity that they might be called siliceous iron ore, rather than sandstone (No. 17). About half a mile before we come to this sandstone, in the middle of the road, are seen some projecting blocks, of a black colour and cavernous structure, so as to simulate lava, for which I took it at first, when at some distance; but, on a closer examination, it proved to be the lateritic stone of this part of India, differing from that of the Red Hills, and other localities of the Carnatic, in containing more quartz, being more cavernous, with more sinuosities, which are empty, not being lined by, or filled with, felspar (No. 18). It is evidently a conglomerate rock, some of the composing pebbles being carbonate of iron, of a dark brown colour. As these lateritic rocks are, as it were, impacted in others of purple-coloured sandstone, and protruding in a similar way to those of the latter rock, we may infer that the cavernous iron ore forms a bed in sandstone.

PUDDAPANGALLEE, *Jan.* 30.—About five miles before reaching this place, and between it and Yernagorium, is seen a small hillock, to the right hand side, near the road. I was riding in company with my friend Colonel Cullen, conversing on the geology of the district we were travelling through. He told me that just before us there was a very interesting phenomenon; nothing less than shell-limestone underlaying, and alternating with, basalt. Before reaching the place I saw in the dry beds of the torrents, and in the ditches on both sides of the road, a very compact, conglomerate sandstone, which I will hereafter describe.

As may be supposed I was extremely anxious to arrive at the locality indicated by Colonel Cullen, which we did, in less than half an hour.

Having reached a nullah, which ran down from the north declivity of the hillock, we dismounted, directing our horses to be taken a mile or two farther on.

In the bed of the dry nullahs, as well as along the road, were seen blocks of limestone, some of them loose, and others implanted in the soil of the declivity of the hillock. This rock has a white colour, and a fracture semi-chonchoidal and glimmering, on account of the numerous crystals of carbonate of lime, into which all the fossil shells are converted. The height of the hillock may be three or four hundred feet above the plain, and the slope of the northern side is gentle and gradual. Its form is oblong; the ridge having a north and south direction.

The north declivity is covered with blocks and large pieces of basalt, scattered and intermixed with those of the limestone. Some of the masses of the last mentioned rock were entirely composed of shells, converted into brilliant and sparry crystals of carbonate of lime. It seems, that they must have undergone violent compression, since they are fractured, and many of them crushed into comminuted fragments. This limestone is very compact, and differs from that a few yards higher, in not containing sparry particles (No. 19). Ascending still, the basaltic masses became more numerous, both loose and fixed; many of them decomposing in concentric layers, and passing into wacke (No. 20). Although this trap appears tough and of a firm compact texture, yet when looked at through a lens, it is observed full of microscopic cavities, some of them lined with a yellow powder (No. 21).

The top of this hill, which forms a kind of table-land, is capped with basalt, apparently extending a few miles eastwardly, and decomposing in concentric layers, which are clearly seen in the dry beds of brooks, having their line of separation well defined. This wacke contains no shells of any sort (No. 22). Many of the masses of basalt, on the summit of the hill, are vesicular, sometimes approaching amygdaloid, not only on the surface, but also in the substance of the stone. Not rarely, large isolated nests of this amygdaloid occur in the compact basalt, the cavities being, in both cases, lined or filled with calcspar (No. 23).

Descending a little way to the right (N. E.) we came to a thick bed of limestone projecting in a little ridge, a foot or two raised above the side of the declivity, running some hundred yards east and west, and cutting the hill in a direction parallel to its base; it appeared to be vertically situated. The outgoings of this bed are tufaceous, as well as the surface of the implanted blocks all around it, and in which the fossil shells were clearly distinguishable, such as oysters, limas, small melaniæ, &c. (No. 24). Notwithstanding the tufaceous structure of the outgoings of this bed, the limestone, when fractured deep, exhibits a texture similar to that of the loose blocks on the declivity of the hill,

full of small cavities lined with calcspar, and exhibiting only the impressions of the shells, their substance having been absorbed.

The colour of this compact kind of limestone is whitish, verging to yellow, and its geological position appears to be that of a bed in the wacke, into which last the trap has decomposed; so that the calcarious rock is imbedded in, and alternates with, the decomposed basalt. Descending a little lower down, the wacke is again seen, with jasper, of a very compact structure, in the form of thick veins, or thin ramifications, or in beds (No. 25), in which, however, no fossil shells are contained, as we know to be the case in other localities in India, where the basalt overlays shell-limestone, and a similar kind of sandstone to that mentioned in these pages. The wacke being removed by atmospheric influences, these pieces of jasper are scattered over the ground.

The outlines of the hills to the eastward, appeared to indicate their being of the same formation as the one we had examined; and Colonel Cullen, who had, some years before, examined the whole of these hills, confirmed my surmise; with the addition, that the other hills being loftier than the one we stood upon, and presenting deeper nullahs, vertical escarpments and precipices, better opportunities were afforded of seeing the position of the rocks.

This place is about ten miles from the right bank of the Godavery, in a line with Rajahmundry. Along the road to the last mentioned place, at the foot of this group of hills, immense blocks of conglomerate red sandstone are seen, apparently underlaying the limestone. Many rounded pebbles, resulting from the disintegration of this conglomerate, bestrewed the road, and lay in many of the nullahs (No. 26).

Having travelled a couple of miles towards the Godavery, I saw, in the middle of the road and in a nullah near, the outgoings of a thick bed of limestone, which in texture, compactness and composition, differed from that we examined in the hill. It was crystalline, contained no shells, was of a grey colour, with the aspect of dolomite (No. 27). This bed is evidently flanked by the wacke and basalt, which are seen, the one in concentric laminæ in the beds of brooks, the other implanted in the vicinity.*

To conclude my short account of this interesting locality, judging by what a cursory examination can warrant our saying, regarding the geological position of these rocks, it seems—1st. That the lowest visible rock is the conglomerate red sandstone, so common throughout this district†—2d. That shell-limestone is a subordinate rock to it—3d.

* Is this crystalline limestone, without shells, of the same age as the compact kind containing them? And, if we suppose that the igneous rock converted it into dolomite, why did it not produce the same change in the other?

† Putting aside the consideration that basalt appears to be the *lowest rock*, not only in this locality, but perhaps in all the crust of our Planet.

That jasper must have had its origin in sandstone, acted on by the igneous rock, which, bursting through both the sandstone and the limestone, altered their nature.

Colonel Cullen informed me that, in the hills further east, the beds of shell limestone are seen alternating with the corresponding beds of trap, in more than one locality, and that tufaceous limestone contains the shells of large *ampullaria*, living now in many of the tanks in India.

Rajahmundry, *Jan.* 31.—During the freshes, the Godavery must carry an immense volume of water, judging by the breadth of the whole bed, which cannot be less than three miles. Puddapangallee, being ten miles from Rajahmundry, when we entered the dry bed of the river we had gone only seven miles; therefore we had yet to go three miles to the latter place, which space is all occupied by the water of the river during the rains. At this time of the year the stream is hardly half a mile broad; of the remaining breadth, there are two miles of very fine and deep sand, from the right bank to the margin of the present stream, and half a mile of the same sand on the left bank. The tide does not reach Rajahmundry, which is about 30 miles from the sea.

The sand carried down by the Godavery, is the detritus, resulting from the disintegration of the granitic rocks of the hills about twenty miles north. Were we to judge by the alluvium, daily deposited on the banks, and by the more ancient one some miles inland, the water, during the freshes, must flow with extreme velocity, after having run along a level ground, to be able to propel large rounded pieces of rocks, many the size of an orange, while the ordinary impetus of the stream carries along only coarse sand. This difference in size of the transported pebbles, according to the velocity and the volume of the water, produces in the silt deposited, and still depositing, strata of various composition. We see, therefore, both in the ancient alluvium in the plain round Rajahmundry, and in that close to the banks of the river, strata of large rounded stones alternating conformably with those composed of very fine materials (No. 28). This indurated silt is seen clearly in the left bank of the river, and better still on the sides of the Fort ditch. This conglomerate decomposes easily, however, covering the soil about Rajahmundry with pebbly shingle. Mount Delight (hardly ten feet above the plain!) is the only elevation about Rajahmundry, and is formed of this indurated, easily disintegrated, silt.

In the sandy bed of the Godavery, are found the beautiful *pietre-dure*, so much esteemed; such as jaspers, agates, sardonyx, onyx, cacholong, cornelians, &c. (No. 29), mixed with black, scabrous pieces of kankar (No. 30). These stones, collected so low down the river, are not large; but, I am told that, about twenty-five miles above this place, they are commonly found of great size. They are undoubtedly

derived from the decomposition of the amygdaloidal trap, which, with granite, forms the hills to the north of Rajahmundry. In the indurated conglomerate silt composed of large pebbles, are some pieces of porcelain earth (No. 31), which the natives employ in the manufacture of a fine kind of pottery, very much esteemed all over India. The decomposition of the felspar into porcelain earth, must have taken place after deposition of the fragment, while still hard and compact, so as to be able to withstand in its descent the consequences of attrition; supposing the contrary to be the case, we cannot possibly explain how so friable a body as the porcelain earth, could have been driven to such a distance in water, without crumbling into clay and dissolving.

Kankar is very abundant about Rajahmundry, and it is burnt as lime.

SAMULCOTTAH, *Feb.* 3.—About half past five this morning our road lay between two high hills; the composition of which I could not discover, on account of the darkness.

At day break we approached the village of Puddagarum: before reaching it, I went to examine some hillocks near the road. The summit of the first I came up to, was formed of sandstone of a deep red or purple colour, the grains of quartz being cemented by a ferruginous clay (No. 32). The surface of the blocks at the top is extremely scabrous and beset with sharp points.

In this hill, the sandstone overlays lithomarge, tinged of different colours (No. 33); but in others the lithomarge is overlaid by a lateritic rock. Close to this first hillock, there are two others of greater dimensions, in which the abovementioned geological position of the rocks is seen in a more defined and distinct manner.

A hill to the eastward of the first, has a kind of talus (not formed of any detritus, but by the strata of the sandstone elevated a few feet towards the hill), which extends one or two hundred yards round its foot. This rock being evidently stratified, slabs of any dimensions and forms may be easily detached, for architectural purposes, for which it seems to be extensively employed, judging by the numerous quarries worked in the talus and in the plain round it, where the sandstone is the surface-rock.

The small ridge forming the summit of this second hill is, as it were, capped with modified hæmatitic iron ore, which last rock, in this locality, is evidently stratified (No. 34). In more than one place of this hill, a bed of lithomarge intervenes between sandstone and the iron ore; this is the case at the western extremity of the ridge, where a deep well is excavated to procure the lithomarge, with which the natives mark their foreheads.

Now, it is curious to observe close to this pit, that the masses just above it are the lateritic iron ore, compact in the lower part, cavernous in the upper; but, attention is attracted by the stalactitical projections of iron ore, some one or two inches in diameter, shooting downwards, penetrating and being imbedded in the subjacent lithomarge. Some of these stalactites imitate the drippings from a candle.

The third hill, a continuation of the second, but higher than any in this plain, (being two hundred feet high, or little less,) is capped by the already mentioned lateritic stone. It is very cavernous, mixed with a good deal of sand—a conglomerate in composition—the sinuosities lined, or filled, with a whitish or yellowish clayey substance.

But, what we must not lose sight of is, that this lateritic mass is traversed by thick veins of the compact, glimmering hæmatitic ore: and the passage of the one into the other is hardly perceptible. This is one of the localities in the plains of India, which, together with those on the Neilgherry mountains examined by me, might invalidate the opinion that the laterite is a formation *per se* associated with trap.

The fort of Puddagarum is built on the summit of a hill of this sandstone; and the soil covering the plain is a red ferruginous sand containing many pebbles of sandstone and the lateritic rock just described. Next day I re-examined this locality, and clearly noted the insensible passage between the hæmatitic iron ore and the lateritic stone; in some places, this last overlaying the former, and in others *vice versa.*

Paykarow and Toonee, *Feb.* 7.—These two villages are divided by a torrent, being situated at the foot of a group of hills, which rise in a ridgy form with an east and west direction. Some hills of this group attain a height of about one thousand feet above the plain, and are thickly covered with shrubs and underwood. They are formed of garnetic gneiss with occasional strata of quartz, their direction being that of the ridge itself, viz. east and west, and nearly all of them are vertical; at least those of the summit are clearly so.

The populous village on the left bank of the torrent, is called Paykarow, the other on the opposite bank Toonee. The skeleton of the famous bandit Paykarow is seen hanging on a gibbet here, outside his own village. This marauder gave the Government much trouble many years, and defied the few troops sent against him and his associates; the gang burning, destroying and plundering the houses and property of the Zemindars, and of all who were known to be partial to their enemies. They cut off the ears and noses of those whom they thought befriended the British Government and sent them to our Commissioner, the Honorable Mr. Russell. The energetic and decisive measures of Sir Frederick Adam, carried into

execution, in a prompt and determined manner, by Mr. Russell, caused the dispersion of the whole gang; many of whom were caught and hanged on gibbets.

Anukapilly, *Feb.* 9.—The country, between Toonee and this place, is interspersed with numerous hills and knolls, all of them of a conical shape, covered with thick shrubby vegetation. They are formed of the garnetic gneiss; the only difference between this rock and that of other localities, is that the felspar has the composition of that variety called albite or cleavelandite.

Close to our encampment was a hill, about four hundred feet above the plain, near whose summit is a kind of grotto, over which hang two enormous masses of gneiss, which has been converted into a tiny pagoda, dedicated to the goddess Coocooresha, whose devotees must have patience to ascend 295 steps cut in the rock, besides paying their propitiatory offerings. The view enjoyed from the pagoda is magnificent. The whole hill is gneiss, and, in the large masses on the sides and above the pagoda, the stratification is well marked, the strata dipping eastwardly.

Yellamungallee, *Feb.* 10.—The approach to this place is very picturesque, the village being surrounded by numerous hills rising abruptly to various heights, and assuming the most romantic shapes. The rock is garnetic gneiss, most of the garnets being amorphous, and decomposed into a cancelliform structure, to be explained at a subsequent portion of this journal (No. 35). The quartz strata sometimes resemble quartz-rock, and at others they are divided into many smaller strata conformable to those of the rock. The colour of the quartz is white, except in some few blocks, when it becomes of a rose colour (No. 36).

Some strata of this as well as of the other kinds of gneiss, are exclusively formed either of garnets or felspar, which last mineral, when decomposed, forms a coarse kind of porcelain earth (No. 37). The strata near our camp had a vertical position, their direction, and that of the other neighbouring hills, being about N. E. and S. W. dipping west. These strata are easily separable, and the pagoda, in ruins at its summit, is built of this gneiss, which is exceedingly well adapted for such purposes, on account of the great facility of its cleavage into slabs of any dimensions and form. The felspar has often a laminar structure, and assumes a beautiful scarlet red colour (No. 38).

Cassimcotta, *February* 11.—Approaching this place, the hills are composed of the gneiss previously described; and the garnets are so

numerous as to form strata exclusively. The direction of this range is the same as the preceding, the strata being nearly vertical.

The sides of some of the hills presented a chalky colour, owing to the number of decomposed felspathic strata. I must here particularize an observation which occurs in more than one place of my note book, regarding the durability of this gneiss, namely, that quartz seems to give a greater compactness to the rock, than when the other two minerals are the only ones composing it.

Besides the seams of the strata, this gneiss is intersected at all angles by many fissures, which divide the strata into rhombs, cubes and other angular forms; which is clearly seen in the two hills close to Cassimcotta to the north. The usual nodular kankar is frequently seen over the soil. This concretionary rock, met every where in the plains of India, and particularly along water-courses, seems of recent origin, and, indeed, to be daily forming.

Aganampoody, *Feb.* 12.—Anukapilly being only three miles on our way to this place, instead of remaining at Cassimcotta the whole night, some of our party went to visit the residence of Sooria Pracasa Row, who has laid out his gardens, and fitted up his houses after the European fashion. Sooria is one of the Zemindars who contributed so materially to the destruction of Paykarow and his gang. He is one of the *raræ aves* among the higher class of people of India. He is very partial to European manners and adopts them (not for affectation sake). He speaks and writes the English language uncommonly well, and his pronunciation evinces hardly any foreign accent. He disregards the show and glitter, the suite of attendants, the umbrella-carriers, and other indispensable appendages of his countrymen, of rank corresponding to his own; and wears none of their ornaments. He came to visit the Governor on a superb Arabian horse, and was introduced without a single attendant. We accompanied him on his return to Anukapilly, and he conducted us to his garden, which was laid out in a most beautiful style, rich with indigenous and exotic plants and trees, before Paykarow laid his destructive hands on it, as well as on his other houses. Yet, being in some degree repaired, the garden and bungalow were in a very neat and comfortable condition, all in true European style. Some of us slept at Anukapilly, and had scarcely eight miles journey to Aganampoody, and did not leave the former village till past seven in the morning.

All the hills on the way had the usual conical shape, and were formed of gneiss. Those to the north of our camp, were quite of a different outline and form from most seen during this excursion, being of a ridgy shape, with spiry summits and naked precipitous sides (Pl. 17 fig. 4). Close to the camp was an isolated hill about

one thousand feet above the plain, of peculiar conformation, being of a conical shape with a vertical, ridgy projection, some feet thick, down its eastern side from apex to base, dividing the hill into two halves, a northern and southern portion. The strata forming both sides have an opposite dip; those to the north dip northward, and those to the south, southward; thus diverging from the projecting ridge, as if from an anticlinal line (Pl. 17 fig. 5). If this vertical ridge had had a black, instead of a whitish grey, colour, as it appeared at a mile distance, I should have taken it for a basaltic dyke, bursting through the gneiss, and at the same time elevating the margin of the fractured strata. I then recollected that, at the western foot of this mountain, there was a dry deep nullah, in the bed of which were implanted large masses of common granite, projecting many feet above it (No. 39). From this I conclude that the lowest rock is common granite, which elevated, and intruded into, the stratified rock.

The appearance of the spiry, sharp-peaked mountains to the north, seems to countenance the above mentioned surmise; nor can we suppose the enormous blocks in the bed of the nullah to be erratic boulders; because many had their extensive, convex surface a few inches only above the bed of the torrent. The other rocks in this plain, are loose pieces of lateritic iron ore, and below the soil a thick stratum of kankar. Carbonate of soda incrusts the indurated sandy soil in some places (No. 40).

WALTAIR, *Feb.* 13.—From the last encampment to this place the hilly appearance of the district continues; the rock is gneiss, the strata highly inclined, and, in some hills, nearly vertical, and traversed by fissures, which, cutting the seams at an angle, the naked sides of the hills are thereby marked with lozenge shapes. The plain before reaching Vizagapatam, is covered with a white efflorescence, like hoarfrost, produced by the small crystals of muriate of soda, deposited after the evaporation of the sea water, with which this soil appears to be impregnated. Numerous pits are dug in the soil, close to the hill of gneiss in the road to Waltair, to obtain the shells many feet below, which are burnt for lime; generally they are salt-water shells. If my memory does not fail me, a portion of this plain has been lately drained, by which the air, before proverbially unhealthy, has been rendered pure, and many thousand acres of land have been reclaimed from the sea.

The hills about Waltair are gneiss; some of the strata are exclusively formed of garnets, sometimes containing more mica than in other localities, occasionally in nests (No. 41). The way from Vizagapatam to Waltair lays through rocky knolls, hillocks and masses heaped one over the other, and before reaching Waltair there is an undulating sandy plain (perhaps not a quarter of a mile broad) of a red colour, the result of the disintegration of the gneiss abounding with garnets.

BIMLIPATAM, *Feb.* 14.—It seems that the range, or at least a branch, of the mountains composed of gneiss terminates in abrupt cliffs and precipices in the sea, a few miles north of Waltair. The tide ebbing after midnight, we availed ourselves of that time to start from Waltair, the road which traverses the shore and passes over the large masses of rock which jut out into the sea, being at that time passable. This spur of the gneiss forms rough tabular masses, which, in a vertical position, extend some way into the sea; and, although the moon shone bright, I could only discriminate the position of the strata. The specimens, which I broke off as I passed, proved to be the gneiss, which prevails in the road we followed.

The hill at the foot of which Bimlipatam stands is also composed of this rock, the strata being in no way contorted, although very much inclined. This is the case, likewise, with this rock, in other localities of the Northern Circars; differing from other species of gneiss common to the table-land of Mysore, and extending as far as Erroad, which are tortuous and twisted in all directions. The summit of this hill is capped with an enormous tabular mass of a lateritic stone, placed horizontally over the bassets of the vertical strata of the gneiss (No. 43). This cavernous, ferruginous clay-stone imbeds very large pieces of the subjacent rock, not only near its surface but also deep in its substance. The nearly vertical position of the strata is seen better than in any other situation of this hill, in the sides of the tank close to the ruined house, which is cut in the hard rock. It must be remarked, that, at the points of contact between the gneiss and the lateritic rock, the former is very much infiltrated with iron.

VIZIANAGRUM, *Feb.* 16.—The plain, for many miles round Vizianagrum, is sandy, mixed with some pieces of quartz; below the soil, in one or two nullahs, are strata of nodular kankar, occasionally imbedding pebbles of hæmatitic iron; the stalactitic kind of this ore being also common (No. 44).

Behind the barracks and the bazar of the Native Regiment quartered here are some hillocks quite different, in aspect and form, from the gneiss rocks we have described. It is common granite, having the mica both disseminated and in nests, and contains a good deal of quartz. Enormous masses of this granite are heaped up in great confusion, some of them placed, tor-like, one above the other; many rest on the convex surface of others, which are deeply fixed in the ground. On the surface this granite has a brownish black tinge, but it is whitish grey in the fracture. When the mica is wanting and the felspar scanty, the rock resembles quartz-rock. Close to these hillocks some blocks of lateritic rock are seen, which have the same position as the granite, that is, implanted in the soil.

The black soil in this locality, as in other places, has a substratum of nodular kankar, besides the tufaceous kind scattered on the soil. In the dry bed of a brook, I saw enormous blocks of this last mentioned rock jutting forth.

COTTEEPOLLIUM, *Feb.* 18.—We left Canada this morning at half-past four. I employed about an hour in examining a hill to the north of the road, not more than two miles from this place. It is rather steep, about four hundred feet from the ground, formed of gneiss abounding in garnets. At the summit I looked for lateritic ferruginous clay-stone, but I did not see a trace of it, nor in the declivities, except a few erratic pieces in the talus. It is in this locality, that I first saw some blocks of garnetic gneiss, with strata very much distorted, their parallelism being not affected. Those on the summit were vertical; at least the bassets of vertical strata were seen running in a direction N. and S., while those on the eastern and western sides appeared to diverge (having the same direction as those of the summit) anticlinally, the western dipping west, the eastern to the east. This hill, and another near, were surrounded with a talus at their base, an unusual occurrence in India. The kankar is abundant.

CHICACOLE, *Feb.* 19.—As it was hardly day-light when we left Cottapollium, I could not distinguish the character of the rocks, projecting here and there close to the road, which appeared of a black colour, and probably were greenstone, or basalt. On arriving at the camp I saw many masses similar in appearance to those passed early in the morning. These were hornblende slate, and those previously seen were probably the same rock, both being in immense tabular masses laid one over the other horizontally, or placed in an erect position, the raised extremities leaning against each other, or heaped together, without any regularity or order; when the quartz was scanty, the rock became characteristic hornblende slate (No. 45).

The highest hill, about five hundred feet above the plain of Chicacole, is composed of garnetic gneiss in a state of decomposition, the strata nearly vertical. From the north side of this hill, is seen projecting along the plain, in the manner of a dyke, many blocks of hornblende rock; and at the foot, facing north, is an enormous vein, or rather bed, of quartz rock, many yards thick, whose outgoings form a kind of shelfy projection at the base of the hill; the direction of this bed being east and west. Most of this latter rock consists of the intimate agglutination of angular pieces of transparent quartz, without any apparent cement (No. 46); although in some parts they are united by a clayey ferruginous paste, producing a kind of silicious puddingstone (No. 47), or claystone porphyry.

Sittumpetta, *Feb.* 23.—In the middle of the new Palconda pass. This road, which has lately been constructed, is cut through a group of hills, covered to the summit with thick impervious forests of gigantic trees, the road lying along the tortuous valleys, and intricate paths at their base. On account of the thick arboreous vegetation, the prevailing rocks are seen now and then only, jutting through an occasional avenue, or in the openings between the trees, or, more perfectly, along the space which has been cleared for the road. They are all of hornblende slate, the strata of which are well defined; the same rock, found near Chicacole, is probably a diramation of this centre group, which appears to give off branches in different directions.

This schistous diorite has a bluish colour, on account of the large quantity of hornblende entering into its composition—its fracture is splintery and glimmering (No. 48); and when the felspar predominates, the colour changes into whitish. In most of the places we have been journeying through, all the hills, knolls and elevations, and projecting rocks of any altitude, have been of the class of primitive stratified rocks, but, the reader must have remarked, that, wherever opportunities of observation occurred in deep nullahs at their base or in the valleys, common granite formed the lowest visible rock. This is the case in the Palconda Pass; the beds of the torrents, which occupy the narrow and deep valleys among these closely crowded hills, show blocks of granitic rocks, deep in the ground, composed of quartz, felspar and a few garnets (No. 49), and exfoliating in concentric laminæ, as other granites do.

Below the soil of the valleys through which we passed, the kankar formed, as usual, a substratum. Some of the hills, near the eastern end of the pass, present denuded, vertical, precipitous façades, which permit of no vegetation, and the stratification of the rock is displayed in the most striking manner. This place recalled to my mind the awful escarpment of the northern side of the Holykooldroog, facing the Koonoor Pass (Neilgherries) the summit of which presents to view the immense strata of hornblende, which rock forms in most places, the extreme vertical precipices of the Neilgherries.

Neemgaum, *Feb.* 25.—The Governor and party, left Cootoor at 4 o'clock p. m. to visit the western end of the pass, the strong hold of a gang of desperate marauders, who, during many years, issued thence to commit highway robbery and murder, maiming those whom they thought friendly to Government; the wild imperviousness of the place, rendering it almost unassailable by regular forces.

Close to Neemgaum is a hill about 1000 feet above the plain, covered on all sides to the summit with thick jungle, and almost inaccessible. Only a few masses of rock, are seen on the sides and at the top. At

the base, however, and some way up, many blocks are seen apparently of the same nature as those on the sides. Many of these are *in situ*; but some have evidently been hurled down from the summit or sides of the hill. They are all hornblende slate, probably a diramation of the Sittumpetta group, being composed of felspar, hornblende in large proportion, and a few garnets—the fracture glimmering and texture extremely tough (No. 50). Although, generally speaking, this rock is stratified, yet there are some blocks that put on the appearance of a granitic, unstratified rock. There is a huge block, just above a hamlet, at the southern base of the hill, which seems to have been precipitated from near the summit of the hill, where many similar are perched, nodding to their fall. This mass, of an oblong shape, is traversed in different directions by regular dykes, either of hornblende, or of greenstone. The diagram (Pl. 17 fig. 6), is meant to represent this block: A is the longitudinal face of its north side, and B the fracture perpendicular to it. Along the lower margin of the northern side, runs horizontally a very thick dyke, the line of demarcation, between the intruding and intruded rocks, being well marked. The dyke having reached the middle of the mass, bifurcates to inclose an oblong mass of felspar, which follows all the wavings of the dyke which thus imbeds it. Looking at the fracture B, we see that the dyke of greenstone did not penetrate so far into the substance of the hornblende slate, as to burst through the other side of the mass; but, having intruded some inches, ended in the substance of the rock (Pl. 17 fig. 7). The texture of this hornblende slate appears to have suffered no change, by the contact and proximity of the dyke. This dioretic rock is of a composition common in India, entire strata being formed of hornblende with a few garnets, and others of felspar alone. The greatest number of loose blocks along the road, from Neemgaum to Kimidy, are gneiss, composed of quartz, felspar and garnets (No. 51). Some masses have occasionally a small stratum, a few lines, of gold coloured mica in the seams.

Kimidy, *Feb.* 23.—At day-break I saw a hillock near the road, formed of immense unstratified masses, which proved to be common granite, with the addition of a few garnets. Although this rock is unstratified in the large, it is laminar in the small, on account of the mica being placed in parallel laminæ. The felspar is in large well-formed crystals in some masses. Close to the town of Kimidy are many erratic blocks of hornblende rock.

March 1.—I rose early this morning, with the intention of ascending to the summit of the high hill which rises behind Kimidy, and had mounted nearly half way up, along a fatiguing path, when a thick fog

descended from the top of the hill, and in a few minutes enveloped it in obscurity. I waited patiently for some time, but, seeing no prospect of the weather clearing, I pushed on towards the summit, and proceeded about twenty minutes, groping my way all the time, both on account of the darkness from the fog, and the slippery nature of the path, which was full of loose stones, rendering my advance difficult and laborious. At last, seeing that there was no hope of the speedy clearing up of the weather, and the time for departure approaching, I descended; breaking some specimens from the blocks on my way. They were of garnetic gneiss, the garnets decomposed, assuming the cancelliform structure. The direction of the strata was E. and W.

Garabunda, *March* 2.—Four miles before reaching this place, I remarked, just in front of us, a very black looking hill, apparently formed of a single enormous block, of an oval form; one third of the broadest part of which was buried under ground. At a distance of two or three miles I took it for basalt; but, on nearing it, I saw no fissures, no columnar structure, no step-like sides, but, an uniform, convex surface. It was about 400 feet high, and when we came abreast of it, another hill, not so lofty, was perceived behind, very convex, and lying against the eastern side of the former one (Pl. 17 fig. 8). These enormous monolithic masses were unstratified, with no trace of split or fissure; the natives call these rocks Chittabunda. Being hardly half a mile from the road and one from our camp, I went to examine it leisurely. On a nearer approach it was evident that they were formed of porphyry, composed of very large, well defined crystals of pearly felspar, imbedded in a paste of hornblende (No. 52). On the convexity of the lower rock to the east, were scattered many tabular masses of the same porphyry, of different angular forms, such as rhombs, cubes, parallelopipeds, &c., all evidently portions of the thick concentric laminæ, into which this porphyry exfoliates. The most striking of these tabular masses is seen in the eastern side of the highest of the two hills, where it hangs from the precipitous face of the rock by a very precarious hold (Pl. 17 fig. 9).

The crystals in this porphyry are very large, many of them being two or three inches long, and many lines thick. It is worth remarking, that nearly all of them are placed in the rock in the same direction, and parallel to each other; at least that is their position on the surface, and I could not see any of them crossing each other, or having different directions. The hills on the opposite side of the road, about a mile from these porphyritic masses, differ in aspect from them, being covered with impenetrable jungle, so as to conceal all rocks, that might project on their slopes and summits. Notwithstanding which, judging by the few blocks, fixed and loose, near the road at their base, they are of

sienitic granite, composed of felspar, quartz, and hornblende (No. 53); the presence of the last mineral accounts for the difference in the outline, and in their being covered with luxurious shrubby and arboreous vegetation; in opposition to the barrenness of the porphyritic ones.

The felspar of this sienitic granite is of a pale yellow, which gives to the rock a different colour to that of the same species in other localities. The hills to the north, very near to our encampment, were formed of porphyry similar to that of Chittabunda. Their black, barren appearance bespoke, even at a distance, the nature of the rocks forming them. That which we are now describing, however, differed in having some clefts and fissures, in which many shrubs take root. In this locality, many of the masses abound with hornblende, with a few garnets, the rock then resembling hornblende porphyry (No. 54), somewhat similar to that rock at Mantoo on the Neilgherries. Here I observed, what I did not see at Chittabunda, large nests, or veins, of a fine grained granite, or of pure hornblende, intruding in the usual irregular manner, and imbedded in the substance of the porphyry.

In general the crystals of felspar are white, but, not rarely, of a reddish colour. On the last described hills were seen rhomboidal and cubic masses like those at Chittabunda, either suspended from the nearly vertical façade, or laid on their convex surfaces. To the south of our camp, facing and hardly two miles from the porphyritic ones, are some hills, the continuation of those of the same nature opposite to Chittabunda, of similar outline, and covered by the same thick vegetation.

CASSIMBOGA, *March* 3.—This village is fourteen miles from the last stage. The pass of Cassimboga is the eastern end of the Sittumpettas; the strong hold of the famous Paykarow, Garolle, and their associates. The narrowest part of the pass commenced about three miles from our last camp, but its whole extent from Cassimboga is eight miles. The Governor wished to survey the place where had been perpetrated hundreds of murders and robberies, the victims being sometimes mutilated to annoy the Government, which was taking every measure to suppress this gang of assassins, which kept the whole province in the greatest confusion and alarm. We did not leave Garabunda until half past six; the road lies between two ranges of hills, along the narrow valleys at their base, which, until two years ago, were covered with thick jungle, almost impervious, except along foot paths known only to those who frequented them. The horizontal branches of the gigantic trees, crossing each other and descending very low, rendered the path difficult and laborious, giving full scope for the attacks of robbers, and, in case of their being assailed, enabling them to resist any force sent against them.

Some of the spurs of both mountains extend more than others into the little flat, the pass contracting in those places. In these narrow spots the gang awaited their victims; and, in such inaccessible positions, a few persons could defy all troops opposed to them. Besides their natural strength these places were guarded by parapets of mud, with a ditch behind them, extending from one to the other, leaving only a very narrow space for passengers. Even this precaution did not appear to them sufficient security. They piled up entire trunks of trees and brambles on the summit of this imbankment, rendering it nearly impregnable. Two or three of these trenches extended from one extremity of the pass to the other. After having resisted several years, the present government put a stop to the iniquities committed by this gang. The officers sent against them, got information of an intricate bypath, full of dangers, on account of the numerous wild animals and the probability of being lost in the jungle. But, English bravery is not easily daunted by difficulties, and in the night the guides succeeded in conducting safely the attacking party to the rear of the enemy. The success was complete; the military entered the marauders' villages, set fire to them, and the conflagration of their homes was the first intimation they had of their being surrounded. Of course, they had recourse to the *sauve qui peut,* and scrambled up the hills. Some were taken, others killed; it ended in the total destruction of this abominable nest of villains. This pass, after the extinction of the gang, was cleared, and a spacious road formed, flanked by several hundred yards of clear ground.

We have said, that the hills of this pass are porphyritic to the north, granitic, to the south. A mile or two from the eastern end, a dyke of basaltic hornblende is seen (No. 55), flanked to the west by projecting masses of porphyry; it is of moderate thickness, and many hundred yards long; some of the exposed blocks have a cavernous or amygdaloidal structure. Further on, at a little distance from the road (S.), I saw another dyke of the same trap, capped by a stratified rock, seemingly gneiss.

After passing these dykes, all the hills and knolls to the left were of the already described porphyry, and those to the right, granitic. Only one hill, about four miles before reaching this place, is of a different composition. Its lower part was porphyritic granite, the crystals of felspar being neither so large, nor so well defined, as in the porphyry of the pass, but yet the rock was unstratified, in immense masses, exfoliating concentrically. This granite is overlaid by gneiss, resembling that of Kimidy, with a profusion of amorphous garnets.

In the brief manner these cursory notes permit, we may draw the following conclusions, with regard to the geological features of this noted pass. The hills, which confine it to the north, are porphyritic

almost exclusively; those to the south are, in general, gneiss with garnets, with one or two hills of granite. The porphyritic formation seems to extend as far as the Mahandry mountain (N.), the highest in this district, which does not appear to have the conformation, outline, and black aspect, of those formed of porphyry. The soil all along the level of the pass, is sand and clay of a reddish colour; the nodular kankar forms the stratum under the vegetable soil, and is also scattered on its surface. A few pieces of loose lateritic stone were met with, but none implanted in the ground; the gravelly detritus of this ferruginous claystone on the soil was not scarce.

POONDY, *March* 5.—The sand, over the whole plain before reaching this place, is very fine grained, whitish and extremely loose. Having ferried over the river near Poondy, we proceeded to our camp, pitched on a sandy eminence, not two hundred yards from the sea. In the swamp, between the river and Poondy, are numerous blocks produced by the oysters, which are very abundant at this place, the masses projecting some feet above the mud. They are composed of nothing else but oyster shells, with little cement agglutinating them. These are the only rocks at Poondy; cut into square pieces they are used for constructing the walls of huts; with them, also, they line the interior of wells, to prevent the sand, through which they are dug, from falling in. The water of these wells, although a few yards only from the sea, is perfectly fresh and drinkable.

About two miles north of our camp, near the beach, a village is situated at the foot of a granitic hill, the rock of which is composed of a great quantity of garnets and hornblende, with felspar. At the surface of some blocks the rock appears stratified, but the huge masses at the summit are all unstratified. In the more compact pieces the felspar changes into albite (No. 56); and some, composed of a prodigious number of large amorphous garnets, are knobby on the surface, owing to the two other minerals having decomposed, and left the decomposing garnets, like small filberts, protruding (No. 57). Not rarely some masses are entirely formed of garnets, to the exclusion of the other minerals. All the black looking masses along the beach and protruding from the sea, opposite to this hillock, are the continuation of this rock.

POONDY, *March* 9.—The whole plain west of this place, and along the shore for some miles, is covered with a very thick deposit of whitish, extremely fine, loose sand, which, extending for a quarter of a mile inland, is undulated with numerous swells and small elevations of this highly comminuted sand, on which nothing but a species of

convolvulus grows. In this thick stratum of sand no shells are to be found, except those thrown by the sea on its surface. Under it, however, a clayey stratum, the thickness of which it is difficult to ascertain, contains a great many shells, both salt and fresh water. This is clearly seen in the sides of wells; in digging which they always come to this clayey substratum, before water is obtained.

Many of these shells are identical with those of mollusca now living in the river and on the shore, besides the pelagic ones. The stratum of clay with shells, extends three or four miles inland, where pits are dug to procure them for lime; and these fossils may be seen, even, in the soil thrown up by the large crabs which burrow in the ground.

In the plain of Poondy we thus see phenomena similar to those witnessed at Vizagapatam, and the same inferences may be drawn at both places. There are frequent signs, along the eastern shore of the peninsula, of estuaries, or shallow bays, having formerly existed, into which rivers discharged their waters: thus the clayey stratum, containing sea and fresh-water shells, must have been deposited. When the catastrophe happened which heaved up to its present altitude this part of India, the clayey bottom of these estuaries containing shells, was raised into the atmosphere, and, at the same time, the hills around. The subsequent decomposition, and gradual decay, of these mountains, has covered this stratum of clay with one of sand.

Poondy, *March* 11.—About a quarter of a mile north of the village of Guirzinghee, two miles from Poondy, there is a ridgy hillock, two miles from the shore, not more than 200 feet high, its direction east and west, sloping gently on both northern and southern declivities; with the village of Carverà at its northern foot. It is composed of the usual garnetic gneiss, stratified. The felspar, one of its ingredients, is of the species called albite or silicious felspar, in a granular state, and also in slender needle-shaped crystals (No. 58). The cleavage of this gneiss is in the line of the seams, which renders it extremely useful for architectural purposes, as it splits easily in the usual way of masses with parallel surfaces.

This rock, to the touch has a harsh, rough feel, probably on account of the great number of the crystals of silicious felspar. The albite sometimes is in slender prisms, one or two inches long, particularly when on the surface, dispersed through the rock without regularity or any common direction; many crossing each other forming a net work. No mica enters into the composition of this gneiss, except a few plates dispersed through the rock; a few garnets, which are imbedded in the albite or cleavelandite, are not always in regular crystals, sometimes being finely granular, which gives the rock a remarkable glim-

mering (No. 59). Between the seams of the strata, the albite sometimes forms a thin stratum of the pure mineral, in needle-shaped crystals. Judging by the outline of the hills six or seven miles west of Poondy, it would seem that they are formed of the same gneiss as that near Carverà, the ravines, down their sides having the same reddish appearance in the places divested of vegetation.

Leaving this hill, and going north about two miles, in the middle of the road are some enormous masses of porphyry, their surface nearly level with the ground and convex, perfectly similar in composition to the rock of the Garabunda pass, the crystals as large, and as well defined. About fifty yards beyond these masses, was a heap of immense blocks of the same rock, many implanted in the soil, while others were placed, tor-like, over the surface of the former. In these rocks the crystals of felspar were better defined and larger than those of Garabunda.

Not more than five yards to the west of these rocks, is a small double eminence, composed of albitic gneiss, similar to that of Carverà, on the little ridge of which were placed many granitic blocks, analogous to those of Guirzinghee. Looking at the direction of the masses of this porphyry, which is precisely the same as that of the pass, it is more than probable that they are the prolongation, under ground, of the same formation. The hillocks and small eminences in other parts of this plain, are either the common garnetic gneiss, or that in which the laminar felspar passes into albite; through which the porphyry at this place seems to have forced its way.

In conclusion, we may be permitted to make a few general remarks on the phenomena observed during the journey. The first is the singular fact, observed and mentioned by writers on Indian geology, Dr. Heyne among others, of the total absence of organic exuviæ in both species of kankar, which, notwithstanding the different periods of their deposition, are alike deficient in this respect.

The same remark has been made with regard to the laterite, in which no shells or other fossils have been found, either in the Indian peninsula, or on the opposite continent and adjoining islands. Such absence is more remarkable, because it is observed of two rocks, the one concretionary, the other conglomerate, which appears to indicate an origin not very ancient; and the kankar, in particular, which invests, not only the detritus and small pieces of the unstratified and stratified primitive rocks, such as granite, gneiss, hornblende, chlorite slate, actynolite schist, quartz, &c.; but also the modern ones, I mean the fossiliferous, such as mountain limestone, sandstone, basalt, &c. The lateritic rock at Puddagarum, is the modified hæmatitic iron ore,

and the conglomerate rock results from its detritus. At Nullacherla, the blocks were little above the soil, and situated in the same position as those of conglomerate sandstone, evidently forming a bed in the last mentioned rock. The third kind of laterite, that at the summit of the hill of Bimlipatam, overlaying, and imbedding fragments of, gneiss, both at the surface and near the points of contact with the subjacent rock, contains many veins of hæmatitic iron of different thickness, into which it passes in its lower part. Those blocks called laterite at Puddagarum are, evidently, in appearance, and in the circumstance of association with the hæmatitic iron ore, analogous to that of the Neilgherries; of the other two, we must be satisfied of their similitude, by induction only.

Adverting to the rarity of contorted strata in the rock prevailing in this part of India, namely, garnetic gneiss, with occasional intermixture of albite; and to their frequency in the other variety of the analogous rock, containing mica, in many other localities, we must feel anxious to inquire, what is the real cause of the difference in the forms assumed by the strata, when in a semi-consolidated state.

Along the route which we have travelled, the only two places, where I met with gneiss whose strata were contorted and undulating, were the hill of Bezoara, and that about two miles west of Cottipollium. We must not omit mentioning, that, in both places, the disturbance did not extend far; at Bezoara it occupied only one side of the hill; and in that near Cottipollium, the contortions were seen only in loose, erratic blocks, perched on the south declivity of the hill. It is necessary here to remark that, through the Bezoara strata, were seen large dykes, or beds, of greenstone, which, evidently, must have contributed greatly to the distortion of the strata.

The other variety of gneiss, containing mica, such as that in the table-land of Mysore, and elsewhere, is traversed by numerous basaltic or porphyritic dykes, the existence of which suggests a plausible reason for the disturbed strata of gneiss in that district.

Thus, suppose two enormous dykes of basalt, at a certain distance from each other, bursting through the semi-consolidated, horizontal strata of a rock, say gneiss, enclosing between them a certain extent of these strata, which, we suppose, to be under a moderate pressure from above: what will be the consequence of a force, such as that of the intruding basalt, applied on the extremities of the strata, in opposite directions?

The luminous experiment of Sir James Hall, answers satisfactorily this question. He put on a table different coloured square pieces of cloth, horizontally, one over the other, having put a board with a moderate weight on them (Pl. 17. fig. 10): *a a*, are the pieces of cloth, which, in the beginning of the experiment, were horizontal; *b* the

weight; *c* the table; *d* the two pieces of board, which are made to slide on towards each other. It was found that the superincumbent weight was raised some few inches, and the horizontal pieces of cloth became distorted, like the strata of many rocks.

We must take into consideration the numerous fissures, through which the immense quantity of trap in India must have been erupted at some remote period, and of which, at present, nothing remains, except the outgoings of these gigantic dykes, on mountains, and in plains, sometimes invisible, because covered with the soil.

The mass of gneiss, which we have supposed to be enclosed, and compressed between two opposite forces, having been lifted into the atmosphere; owing to the comparatively speedier decomposition and disintegration of the basalt, which, after a time, falls away, the contorted stratified rock is left, either as a solitary block, or as an implanted mass in the detritus of the imbedding rock accumulated round it.

This must have been the case, with many of the masses of gneiss near Bangalore, Golcondapatnam, &c.; whose strata, although exceedingly disordered, yet have very little trap in their vicinity, which, however, is seen at some distance from them. After what we have stated, we may safely affirm that the frequency of intruding rocks in a formation of stratified ones, produces the contortions in these last; and that when rare, or totally absent, no disturbance in the strata is observed.

To conclude these cursory notes, we will give a brief catalogue of the principal rocks, examined during the journey, ranged according to their degree of prevalence.

1. Garnetic gneiss, the felspar sometimes changing into albite or adularia.
2. Porphyry.
3. Hornblende slate and rock.
4. Sandstone.
5. Kankar, ancient and modern.
6. Shell limestone.
7. Common granite.
8. Basalt.
9. Lateritic iron ore.
10. Sienitic granite.
11. Black soil.
12. Alluvium.

X.—*An Account of the Tribe of Mhadeo Kolies.*—*By* Captain A. Mackintosh, *27th Regiment Madras Native Infantry, Commanding Ahmudnuggur Police Corps.*

Preliminary and general observations, respecting the different tribes of Kolies, and where they are located.

Among the various classes of inhabitants, within the territory forming the Government of Bombay, the names of few are more familiar to us, than that of the tribe of Kolies—more usually written Cooly* by the English. They are to be found nearly in every part of Guzerat, and, in several of the districts of that province, they constitute a very large proportion of the agricultural population, and, in many instances, are most notorious robbers. They are very numerous in the Attaveessy, and there are many settled in the northern Konkan. In the hilly tract of country, lying between Moossa, south west of Poona, and the hill fort of Trimbuck, the source of the Godavery river, the inhabitants are chiefly Kolies, and a few are scattered over the districts of Candeish, Ahmudnuggur, Poona and Shollapoor, and along the Ballaghaut on the western frontier of the Hydrabad territory.

Although the information we possess of these people must be considered rather imperfect, I think we may venture to say, that, in the earlier ages, they were the only inhabitants of a portion of Guzerat and of the Attaveessy, for a part of the latter tract of country is termed by the natives Kolwun or country of the Kolies. Hills and forests, and such formidable barriers, will tend to divide communities, and local situations will not only induce new and appropriate names, but will also produce some difference in manners and habits. Notwithstanding that these people have, in the course of time, separated into different classes or minor tribes, they continue to retain the general appellation of Koly; which seems powerful evidence of their original affinity, and of their being branches of the same stock.

The following are the common designations of the different classes or castes of the tribe of Kolies; and they appear to be located nearly as here described.

* On a former occasion, I ventured to derive the term *Cooly*, applied by us to porters, labourers or persons who work for hire, in the following manner—as the fishermen, boatmen, and many of the common labourers, at Bombay, and along the coast, are Kolies, the term *Cooly* may have originated among the English at Bombay. A passenger coming ashore, when a ship arrived from Europe, might have wished to give a box or package in charge to a native (probably a person of rank or caste); he would say, or a servant in attendance might say, that he would fetch a Koly, or a certain number of Kolies, to take "master's baggage" to the shore. Thus the term would have become familiar, and, in the course of time, would be indiscriminately applied to all porters or labourers, and soon have spread among the few English settled in India in those days.

The Raj Kolies reside chiefly in the Attaveessy, and in the Wunn, Dindory and Nassick Pergunnahs. A few are settled in the vicinity of Jowair, in the Konkan; they are cultivators and labourers. They worship the gods Khundobah, Bhyroo and Bhowany. They say that they have derived their name from the Koly rajahs in former ages having intermarried with their ancestors, and employed them in their service as domestics and sepoys. The Sir Naik Ballajee Buddajee resides at Wagyra, in the Nassick districts, and holds the village of Vellgaum in free gift, and enjoys several perquisites. The village, &c. was presented by the Jowair rajah to one of the Naik's ancestors. The Naik settles disputes connected with the infringement of their customs. These Kolies are sometimes called Bhen Kolies, and are said to have originally belonged to the tribe of Mhadeo Kolies, but, having committed some irregularities, they fled from their tribe and associated with Kolies of an inferior description, and at present hold no intercourse with the Mhadeo Kolies.

The Solesy Kolies are settled in the same parts of the country as the Raj Kolies; and are also cultivators and labourers. The Solesy Koly is known by the name of Lall Lunggooty Wallah Koly, and Kasthy Koly. They worship Khundoba, &c.

The Toukry Kolies are inhabitants of the Attaveessy, principally around Peint and Dhurrumpoor. Like the other Kolies some of them are cultivators and others labourers. As the term for a large bamboo is toukry, and a number of these Kolies are employed cutting down bamboos, that are afterwards conveyed to the coast and to the Dukhun for sale, it is said they derive their name from their employment. They worship Khundoba, Bhyroo, &c.

The Dhour Kolies are numerous in the Attaveessy, and a few of them are settled in the Wunn Dindory districts. They appear to be the most degraded of all the tribes, and do not hesitate to partake of the flesh of cattle that have died a natural death, and they are, at the same time, the most determined drunkards. When I was employed in the Attaveessy in 1820, this tribe was considered no better than the Dheres (pariahs) of the detachment with me. They are farmers and labourers; some of them are employed in cutting down the teak-wood within the districts of the Peint and Wassoonda rajahs, &c., which the timber merchants from the towns in the Dukhun purchase from them.

A few enterprising Parsees, who are settled in some of the largest villages on the public roads leading through the Attaveessy, supply the Kolies with abundance of arrack, distilled from the mowah flower. The Koly pays the Parsee in grain for his spirits. In many places they distil the liquor for their own consumption. These four classes seem to be one and the same people in the Attaveessy, but there appears

to be some difference in the manners and habits of those residing in the Wunn Dindory districts. The Naiks adjust matters connected with the usages of their tribes.

The Doonggury Kolies.—A few of these Kolies reside in the Attaveessy and in the Wunn Dindory districts. They are farmers and labourers, and some of them are employed as the local police of the district, in the pay of government. Kolies that reside near a hilly district are termed occasionally Doonggury Kolies, from Doonggur a hill.

The Bheel Kolies are not by any means numerous. We find one or two families settled in a few of the villages along the banks of the Pera and Godavery rivers. They appear to have been runaways, who associated with the Bheels, and subsequently intermarried with them.

The Mullar Koly.—This Koly seems to be one of the most pure and respectable classes of all the tribes. They are also known by the name of Panburry Kolies, from their employment of supplying the villagers and travellers with water. They generally employ buffaloes, to carry the pukhall (leather bag), in which the water is contained. The Panburry Koly is a member of the third division of the Bulottah institution, and receives his pay in kind from the villagers for his services. It is his duty to wait on travellers in the employ of government, and strangers; to clean out and plaster (with cow-dung) the floor of the Dhurrum Jalla or Chourry (the public resting place); to supply them with water, &c. He also attends at all festivals, marriages, &c. in performance of his duty. This Koly is also termed the Choomly Koly, from a twisted piece of cloth, which he places on the crown of his head to rest his water pot on. The same Koly is frequently called the Koonm Koly, from his associating with the Koonbies or cultivators, for they occasionally partake of food at each others houses. One or more families of the Mullar Kolies are settled almost in every village in the Dukhun and in Candeish, and along the Ballaghaut in the Hydrabad territory, extending eastward to Khandhar, Indore and Boden, between the Godavery and Hydrabad; they are settled in the Ballaghaut (in a south-eastern direction) in the vicinity of Nulldroog. In many of the villages around and south of Punderpoor, this Koly holds the situation of the village Efskur, or beadle, and is consequently termed turrall. We find them occasionally employed as sepoys and village watchmen. In such villages in the southern portion of Candeish and north of the Godavery river, as the turrall (the person who performs the duty the Panburry Koly does in other parts of the country) is either of the Dhere or Bheel tribe, a Koly is engaged as his deputy to perform the service, his own low caste not admitting of his doing so. There are a few Mullar Koly Patells of villages in the Candeish and Ahmudnuggur districts. The hereditary Kolies of the

hill-forts of Poorundur, Singhur, Torna and Rajghur, all south of Poona, are Mullar Kolies, their duties consisted in guarding the approaches leading to the forts, &c. They held enam lands and received regular pay from government, besides enjoying the privilege of cutting grass and firewood, &c. In the year A. D. 1340, the Singhur Koly Naik resisted the attacks of the army of the emperor Mahomed Toghluk, during several months. A few of these Kolies are settled at Bombay, and along the sea coast, as cultivators. They worship Khundobah, Bhyroo, &c.

The Aheer Koly.—The Kolies of this tribe are inhabitants of Candeish, and they reside chiefly in the villages along the banks of the Girna river, and on the southern bank of the Taptee, one and two, and sometimes five and ten, families, are found in those villages. They are very poor, but there are several instances of their holding the Patellships of villages in the vicinity of Yewull Sakry. It is said they originally came from the south. They are not held in high estimation, for they perform the hereditary duties of the turrall, or village Mhar, or Dhere (pariah), and, on this account, are entitled to receive the skins of bullocks and buffaloes that die a natural death, and they plant the horns of the animal in front of their door and worship it. The Aheer Koly is engaged occasionally to perform the duties of the jaglah, or village watchman, and at times as the Koly or water-man to supply the inhabitants and travellers with water, &c. In some villages, where the members of a family of the Aheer Kolies perform the different duties of the turrall or village beadle, those of the Koly or waterman, as well as those of the jaglah or watchman, they have been presented by the British government with from ten to fifteen, and twenty to thirty, beeghas of land in free gift, according to the size of the village, and the responsibility of the duties they had to discharge. The object of this grant, was to ensure their becoming more faithful and diligent public servants. They worship all the Hindoo deities, but the goddess Kanby Ranby (a derivative of Bhoany) is an object of great adoration with them. Their marriage ceremony is performed by a Brahman, and usually in front of the shrine of Kanby Ranby; this does away with the necessity of providing a feast for all the guests, &c., so that the expense incurred is trifling. They have two chief Naiks, who adjust matters connected with the affairs of their caste, one of these resides on the banks of the Taptee, and the other near the Girna.

The Muroy Koly performs similar duties, in every village in the northern Konkan, to those the Panburry Koly discharges in the Dukhun. He receives the Balottah allowance, and holds a piece of ground rent free, worth a few rupees. There are about a hundred families of the Muroy Koly at Bombay; they serve as palankeen bearers, labourers and porters.

The Sone Kolies are settled along the coast from Angriah's Colabah to Surat. At Bombay and Colabah (old woman's island) there are about two thousand houses of the Sone Kolies; they are all fishermen, with the exception of a few that enter as sailors on board of ships belonging to native merchants. It is said they have a dislike to going on board of vessels, owned and commanded by Europeans, in case they should lose their caste. They state that they came originally from Angriah's Colabah. They follow the profession of arms there, and do duty in the fort. Their chief men are styled Patells. The chief Patell resides at Angriah's Colabah; he possesses all the authority of the Goturany, and adjusts all disputes and irregularities connected with the infringement of the usages and rules of their caste. The chief Patell has an agent, termed Shisha (disciple), in each village or community of the Sone Kolies, who settles all disputes of a trifling nature; but, when it happens to be one of importance, it is submitted to the chief Patell Kanoojee at Colabah, for his consideration.

Such persons as are proved guilty of unchastity, are repudiated from the caste, and not re-admitted. So are such offenders as infringe their customs, and disregard the authority of the chief Patell. Occasionally a person who has behaved in a vicious and immoral manner, although he may have been rather perverse, yet, if he subsequently seems very penitent, he is received again by his kinsmen, after a large quantity of liquor has been expended, producing the inebriation of the greater portion of the assembly. In fact these Kolies seldom or never meet in any number, on occasions of congratulation, or of condolence, or for the adjustment of affairs connected with the usages and customs of their tribe, that they do not drink large quantities of spirits.

Their women, contrary to the usual customs of other Hindoo castes, wear long sleeves to their choullies, or jackets, and have glass bangles only on the left hand. At the time of their marriage, the bangles intended for the right wrist are consecrated, and cast into the sea, on which occasion the spirit of the ocean is invoked, and asked to be indulgent and kind to her husband, and to preserve her from becoming a widow, while he is traversing the deep in search of a livelihood. As a substitute for the glass bangles thus devoted, three silver ones are worn on the right wrist—several of these Kolies are said to possess great wealth. There are from five to six hundred families of the Sone Kolies settled at Bassein. Some of these serve as palankeen bearers, while those at Bombay are all fishermen. There are a good many of the Aggry Kolies settled at Bombay, Bassein, Thanna, and Punwell; also along the coast towards Surat. These people are boatmen, and serve as sailors on board of vessels belonging to natives. Some of them are palankeen bearers, cultivators and labourers. Their chief Patells settle matters connected with their caste. They worship the god Khundoba, &c.

The Mettah Kolies appear to be confined entirely to Bombay, where they have between five and six hundred houses. From residing on the hill, or rising ground, south of Mazagong, they are occasionally termed Doonggurry Kolies, from *Doonggur*, a hill. The part of the native town called Doonggurry derives its name from these Kolies, having originally been the first inhabitants, not only of that spot, but of the island of Bombay. In fact, they assert that the place belonged to them in days of yore. They are all fishermen and seamen; they do not retail the fish themselves, but hand them over to other persons in the bazar. There are persons of considerable wealth among them, who are owners of vessels that trade along the Malabar coast, navigated by sailors of their own tribe. The head Patells, Gopalljee Guary and Bheojee Soory, adjust all disputes connected with their caste. Such persons as are proved guilty of unchaste and immoral acts are expelled from the tribe, and not received back again into their community. These Kolies consume large quantities of liquor at their festivals, and convivial and ceremonial meetings. The wives of the Mettah Kolies devote the glass bangles of the right hand to the deep, to propitiate the spirit of the ocean for the sake of their husbands, in the same manner the Sone Kolies do, and they replace them with silver ones. They worship Khundoba, Bhyroo and Bhowany.

In Bombay, Thannah, Bhewndy, Kallian, Bassein, Damaun, &c. we find a people, termed by the inhabitants, the Christian, or Portuguese, Koly. It is said that their ancestors were of the tribe of Sone Kolies, and that they were forcibly converted to Christianity, some ages ago, by the Portuguese. These people are cultivators, extractors of toddy from the palm trees, and others sellers of fish. They follow the precepts of the Roman Catholic faith; but it seems an extraordinary schism has sprung up among them, or, it ought rather to be said, that some of them have forsaken the true faith, and reverted to paganism. This retrogression took place about the years 1820 and 1821, when that terrible scourge, the cholera morbus, was raging so furiously in the Konkan, and along the coast. Many of these poor ignorant creatures, seeing desolation spread in their families by this heavy visitation, thought they would be much more fortunate and happy, were they to pay their adorations to Devy, Khundoba and Wittoba, than by continuing to do so to the Almighty. A portion of them having accordingly come to this resolution, they at once abandoned the true God, and supplicated these false idols to be merciful and kind to them, and to relieve them from the distress by which they were surrounded. They have discontinued all intercourse with their Christian brethren, and resumed the custom of wearing the *sendhy*, or tuft of hair on the crown of the head. They employ Brahmans at their nuptial ceremonies, but the other Hindoo Kolies, considering them a contaminated race, hold no communica-

tion with them. A few of them are cultivators and labourers while others are sellers of fish, which they cut into small bits, and sell in their booths, or *Thanns*, in the bazar, and are therefore denominated Thankur-Kolies. A few families are settled at Bassein, Thannah, Bhewndy, &c.

There are between three and four hundred families of the Chanchhy tribe of Kolies settled at Bombay. These Kolies bear the character of being a very peaceable and industrious race. They are chiefly farmers, who cultivate various sorts of roots, fruits and vegetables, which they take to market. Others are labourers, and a few of them are employed in the service of native merchants. These Kolies come from Joonagur in Kattywar (Guzerat). They worship Dakkoorjee (Runchonjee) and Mahaluchmy.

The Kolies in Guzerat appear to be divided into several tribes—the Tullubdah, the Puttunwaria, and the Kakrez, the Dhandhour and Babbriah. The Tullubdah are the most numerous. The limits of their country extend from the Baroda district, north, to Khyralloo and Massawnah, on the banks of the river Koopyne; and from Dhollka on the borders of Kattywar to Lunawarra. Some of them are found beyond these limits, but that above defined they consider their own country. The Tullubdah, in addition to being the most numerous, is considered superior in rank to the other tribes. The Puttunwarria will partake of food prepared by the Tullubdah, but the latter will not touch food cooked by the Puttunwarria. It is a very common practice with them, to call each other by the name of the district in which they reside. The Tullubdah Kolies, residing around Kurree, &c. are known by the name of the Chowally Koly, the name of the district. The Kolies in the Mhyee Kaunta, are termed the Parriah Kolies, also the Mhyee Kaunta Kolies. Those residing in the Pergunnah of Dhygown, about 25 miles north-east of Ahmadabad, are known by the name of Kauntt Kolies. The Thakoors* of Lohar and Amlyah in this division are Kolies. The Thakoor of Goorassur, 25 miles S. E. of Ahmudabad, is a Koly of great influence; also the Koly Thakoor of Ometta on the Mhyee. The Thakoors of Agrlore Kuttawun, Bhukkora, Mugoonah in the Chowall, are also Kolies. These Kolies form a very large portion of the population of the districts they reside in. It has been estimated that, in the Khaira district alone, there are nearly seventy thousand of them. They are all cultivators and labourers, and often Pâtells of villages; a few of them being employed

* Rajpoots and Kolies, who are the proprietors of several villages, from which they derive a revenue of a few thousand rupees, or who have an income of a similar amount from revenue and other sources, such as geerass or grass, equivalent to black mail, are termed Thakoors.

as village watchmen, others by native bankers, &c. The Koly watchman is termed Wurttuneeah, Pujy, Pugghy* and Rukha. They hold some land rent-free, for their services, and receive other dues. Formerly, and still in many places, the Wurttuneeah is obliged to be on a good understanding with the Geerassy chiefs in their vicinity. The villagers, or the Wurttuneeah, grant a certain allowance to the Geerassy to refrain from plundering their village.

In almost every second, third or fourth village, there are two or three families, known by the name of the Kotewallaha Kolies. They attend on travellers, particularly the government servants, to procure such articles for them as they may require. They get the potter to fetch water. In all the towns there are a few Kolies termed Selottah. These are employed by native bankers in escorting treasure, or other valuables, and they accompany travellers, from stage to stage, for a fixed allowance. Should the Selottah be at enmity with any of his tribe, he will take a sufficient number of his kinsmen with him to protect his charge. When there is danger, the Selottah boldly steps out to face it, and often has sacrificed his life in defence of his charge, and in the performance of his duty. Some years ago, the Selottah's services were eagerly sought after; they at present attend in expectation of being employed, without being called. In some parts of the country the Koly and Rajpoot Thakoors employ some of their dependants to discharge the duties of the Selottah, in escorting property and travellers through their villages.

In every ten or fifteen villages, there is a Koly named the Nathy Patelliah, whose duty it is to adjust any disputes connected with the infringement of the usages of the tribe. The Nathy Patelliah summons any offender before him, and several Koly Patells, and a few elders of the tribe, investigate the affair and fine the delinquent. He is made to furnish an entertainment for a portion of the tribe, and to pay some money, according to his means. When he has partaken of food, from the same platter with the Nathy Patelliah and some of the others, and has smoked a hooka, of which several of the assembly have also taken a whiff, he is considered to have been readmitted into his caste.

They worship Mhadeo, Bhoany, Ambyka, Devy, Botcherra Devy (Mattah) and Runchore (Krishen) and Hunooman. Of all these, Bocherra, or Betchurra, the goddess who presides over the small pox, seems to meet with the greatest attention from these people. The most sacred and binding of their oaths is that taken when the hand is placed on this idol. Another most binding mode of pledging their faith, is

* The Pugghy is well known as the watchman employed by the officers stationed in Guzerat. He takes his name from tracking the foot marks (*pug*—a foot). They are very expert in their profession.

filling a brass or copper cup with water, placing their hands on it, and repeating the names of all their gods—this they term Pruvopyah.

When any serious quarrel or feud has been settled between these Kolies, they seal their reconciliation by drinking some Koossomb, which is merely a little opium dissolved in water. They are partial to opium, and very fond of spiritous liquors. They are enterprising, bold and most desperate thieves and plunderers; yet they seldom commit murder, unless they are attacked, or resistance is offered to them.

The Puttunwarriah Kolies reside in the district around Puttun, and between the Surrasswutty and Bunnass rivers. I have mentioned before that they do not rank so high as the Tullubdah Kolies; this is on account of their partaking of the flesh of buffaloes. They are dispersed over the southern districts of Guzerat, to the vicinity of the Nurbudah, and in many places are numerous. They are cultivators and labourers, and occasionally employed as watchmen of villages, &c. They worship the same gods as the Tullubdahs, and differ little from them in respect to character. The Kakrez Kolies inhabit the district of that name, to the north west of the Bunnass river. They are numerous, and are bold and enterprising plunderers. The Dhandhar Kolies reside in the district of that name, of which Phanlanpoor is the chief town. They are a daring and wild people. The Bubbriah Kolies occupy the southern portion of the peninsula of Kattywar.

The tract occupied by the Mhadeo Kolies and their origin.

In the following pages, I purpose giving an account of the tribe of Mhadeo Kolies, who reside in the valleys on the east side of the Syhadry range of mountains, extending from Moossa, south-west of Poona, northward to Trimbuck, the source of the Godavery river, and lying between the 18½° and the 20° degrees of north latitude, and 73½ and 74 east longitude.

These small valleys are formed by masses or groups of rugged hills, and less lofty ranges, that diverge laterally in an easterly direction from the main chain of mountains, and are known to the inhabitants by the names of Mawills, Khorahs, Nahirs and Dougs—that is, valleys, glens, straths and wilds. They vary considerably in configuration and extent, and, at the distance of ten, fifteen, and twenty miles from the crest of the Syhadry range, they gradually expand into the spacious plains of the Dukhun, when the collateral branches and groups of hills, within the before defined limits, may be said to terminate, with the exception of the low, irregular branch, that protrudes from the north of Joonere, and runs along to the south of the Moolla river, but diverges much in its advance to Ahmudnuggur, after which it stretches, in a

south-east direction, and ultimately constitutes the Balaghaut of the western boundary of the Hydrabad territory. The chief gorges, or passes, in the principal range, leading down from the Dukhan to the Konkan, and the bottom of the different valleys, may average from 1,800 and 2,000 feet, to 2,300 feet, above the level of the sea; and the most elevated points in the main range may vary from 4,000 feet to 4500 feet. However, the summit of the Kullsabaie hill, one of the detached branches, only a few miles from the forts of Allung and Koorung, rises to the height of 5,000 feet, and is considered the highest land in the Dukhan. Many of these lofty, isolated and rocky hills, were selected by the rulers of the country, some centuries ago, as fit places to be converted into fortresses; and, as the sides of the hills were in general very steep, indeed often quite perpendicular, it was only necessary to erect a gateway, and fortify this entrance, to render the place almost impregnable.

These numerous hill forts,* with a few solitary exceptions, have been dismantled by the British government, as they were considered, in a political point of view, useless and expensive. The original object of establishing such strongholds might have been twofold. First, the cost of fortifying such places must have been comparatively very small. Hills, suitable for the purpose, in the vicinity of large, open towns or villages, were fortified, to afford the inhabitants an asylum to retire to, should a formidable body of plunderers threaten to overrun the country—secondly, the object of erecting some of the hills of a mountainous tract into fortresses, might have been to guard passes leading from one province into another, or to overawe the population; for we know that the inhabitants of a hilly country are a very independent and untractable people.

The inhabitants of many of the villages in these valleys suffer very great inconvenience, during the months of April and May, from the great scarcity of water—yet the fortified hills were supplied abundantly with the finest description of this necessary of life. Tanks or re-

* As I was employed, after the termination of the last Maharatta war, in dismantling the hill forts, I can bear testimony to the general salubrity of many of these lofty dwellings, notwithstanding their very bleak and dreary situation, especially during the monsoon, when that terrible scourge, the cholera, was spreading desolation in the villages, in the plains below the forts, and more particularly those situated in low and confined situations. In the years 1818 and 1819 I had charge of five hundred *Sibundies* (irregular troops), stationed in hill forts; of this body, only two men of the garrison of Anky Tanky died of cholera. A party of *Sibundies*, stationed at that fort, went to a village in the vicinity to procure some supplies; they slept below one night, and, in the course of three days, the men alluded to were seized with the disease and expired. I may add that, out of two hundred workmen, employed in destroying the forts, about twenty of them slept below in the plain, as their families had joined them; while all the others slept under trees on the hill, or in caves. The cholera on one occasion attacked several of those that remained below, and one of them fell a victim to it.

servoirs were excavated in the rocky summits of the hills, where the appearance indicated the presence of water; in these excavations, it frequently becomes necessary to form a portion of the rock into pillars, to support the roof of the tank.

It is to be noticed, that the acclivity, on the western side of the Syhadry range, is always abrupt and very steep. Here, especially, as well as among some of the other groups of hills, there are many grand chasms, with rocky walls, several hundred feet in depth. In these immense ravines, on the summits of the hills, and puthars, or plateaux, there are numerous plants, shrubs and beautiful trees. In many places, in hollows, and on the puthars, there are dense and extensive patches of lofty jungle and forest timber, with thickets of impervious brushwood, particularly south-west of Joonere and around Ambygoun. A variety of wild animals inhabit these jungles. Tigers, cheetahs, hyænas, bears, wild cats, hogs, kollussnahs (wild dogs),* jackalls, gowahs (bison), samburs, neelgaie, spotted deer, antelope, bhekkur,

* The animal, termed by us the wild dog, is known to the natives by the name of kollussnah, kollussa and kollussa. It is common in the Kotool district, and all along the range of western ghauts. It is about the size of a panther, with very powerful fore quarters, narrow tapering loins, black and pointed muzzle, and small erect ears. The tail is long, and at the extremity there is a bunch of hair several inches in length. The kollussnah is of a darkish red colour, possesses great speed and hunts in packs of five, eight, fifteen, and even to the number of twenty-five; is extremely active, artful, and cunning in mastering his prey. It is during the night time they move about in search of food, but, should an animal approach near them, an hour or two after sunrise, or a short time before sunset, they will attack it—all animals seem instinctively to dread them. During the daytime they remain quiet in their hiding places. When the kollussnah discovers an animal worthy of being captured, the circumstance is announced to the pack by a barking, whistling noise; the others are on the alert, advance rapidly and post themselves slyly round the spot, and gradually close in on the animal. Upon seeing one or two of the kollussnahs he gets frightened, but much more so when, running away at speed, he encounters one of his enemies in whichever direction he attempts to escape. The consequence is, that he stands quite amazed--some of the kollussnahs run in close to him, and shed water on their bushy tails, which they swing about and jerk into his eyes; he is successively saluted in the same manner, when he approaches them, or they run in on him. The unlucky beast is soon blinded by the peculiar escharotic quality of the application; for he begins to stagger and run round and round, and is now beset by all the kollussnahs who make a loud barking and snapping noise while they pull the animal down and tear him to pieces. When few in number, they have been known to gratify their hunger before the poor animal fell down or expired, each of them tearing away a mouthful while the animal remained standing. There are very few instances of their ever having attacked the villagers' cattle, but they will kill stray calves if they fall in with them. The Kolies never molest the kollussnah, in fact they are glad to see them in their neighbourhood, being aware of the enmity that exists between them and the tiger, for they kill that animal occasionally; and in consequence they are considered by the people as the protectors of their cattle and their fields, for neither sambur, deer, or hog, seem disposed to approach places much frequented by the kollussnah. They hunt and kill the sambur, neelgaie, hyæna, deer, jackalls, hares, hogs, bears, porcupines and quails. They killed a tiger, in June, last year, in the Teloongun jungles.

monkies; also hares, pea fowl and jungle fowls, with many birds, small and large, of rare and variegated plumage.

Exclusive of the principal passes in the western ghauts, there are numerous foot paths, leading over the mountains, from the Koly habitations above, to the villages below in the Konkan. These paths are very intricate, and it is with much difficulty the people travel along them when loaded, and proceeding with the produce of their fields to the bazars on market days; where the rock is very precipitous they use a simple bamboo ladder,* which enables them to effect their passage by the most direct routes.

During the south-west monsoon, which in general sets in about the end of May, or first fortnight in June, on such days as the rain ceases, not only the summit of the mountains, but the valleys are enveloped in general in a very dense fog, consequently there is always a damp and chilly sensation in the atmosphere at this period. While the months of April and May are often extremely sultry and oppressive below, it is comparatively cool on the tops of the hills. It may be observed, that the scale of the atmospherical heat, as indicated by our thermometers at times in such situations, is an imperfect measure of sensible heat. The climate is unhealthy, after the termination of the monsoon, and the inhabitants suffer much from fever and ague in the months of September, October and November.

The population of the tract just described consists of Thakoors,† some Hutgur and Telwur Kanarahs, and a few Bunjaries, in addition to the Kolies;‡ including also, some Koonbies, who have intruded themselves within a few ages past.

The following is given as the popular tale of the origin of the Kolies. After the death of one of the rajahs of the race of the sun, named Rajah Venn, who was a very great sinner and a very disreputable person (an account of him is given in the Bhugwutta Pooran), a man of a dwarfish size, sprung from his left arm, and he was called Neeshad (base born), and directed by some saint to take up his residence among mountains and forests. He, consequently, was the ancestor of all Keerauts,§ or the barbarous and savage people who inhabit wild places, and subsist by the chase. One of the descendants of Neeshad and a female shoodur, were the parents of the Poolkuss; and a male of the Neeshad lineage and a female of the Poolkuss family, were the parents of the Koly. He was to subsist, by killing whatever animals he encountered in the jungles and forests. It may further be stated, that

* They place a substantial bamboo, divested of its branches, except a small stump that is left at each joint or division, to be used as a step.

† A short account of these people will be communicated in a separate paper hereafter.

‡ There are some Mhadeo Kolies settled around Jowair in the Konkan; the Rajah of Jowair is a Koly. There are some of the same tribe in Bombay.

§ Keeraut, Poolinda and Shubbur, are the Sanskrit terms applied to the Bheels, and other wild hilly tribes.

the Kolies say that they are the descendants of Valmik, the distinguished author of the Ramayun, who, although of Brahman parentage, and born at Veer Walla, twenty-four miles south-east of Poona, it is said followed the life of a Koly. The description of Valmik magnifies him into a huge giant, who could walk fifty miles in less than half an hour. He is reputed to have been a most desperate and remorseless robber and murderer, and that he continued so until he encountered the holy Narud, who ultimately succeeded in persuading him to abandon the wicked life he was leading, for a better and more virtuous one. The Mandur Soombah ghaut, ten miles north of Ahmudnuggur, and close to that beautiful and romantic spot known to us by the name of the happy valley, is said to have been one of his favourite haunts.

The Sanskrit word *kywurtuk*, meaning—boatman and fisherman, is applied by some of the* inhabitants to the Kolies, but in the Dukhun it is unusual to see them engaged as boatmen. A very few of them, from necessity, may in some places follow the profession, for a month or for a season; as the Koonbies, Mallies, Bhooies, Dheres and Mahomedans do. Neither is it common for the Kolies in Guzerat to labour as boatmen. The term might be more appositely applied to the Kolies along the sea coast.

There are several hundred families of the Dhewur tribe of boatmen,

* The Mahomedans and a great many of the Hindoos are very apt to apply the term Koly to persons of various low tribes, respecting whose origin and habits they may be ignorant. There is a class of people, known by the name of Tarroo, who are boatmen at the ferries of the Godavery, &c. and, although they are quite a distinct class, and not very numerous, some persons ignorantly call them Kolies. In the country to the north and to the west of Hydrabad, there are several tribes of low caste people, who resemble the Kolies in some respects. One of the most numerous of these are the people known by the name of Mootrassy. When they cultivate and work as labourers they are so called; those who superintend water courses and tanks, to see the regulated quantity of water supplied to the people, are termed Neerrorrahs; and those who follow a military life are called Tellgolls, which is the familiar word among them for an armed man. The Tellgolls, are much employed as sepoys (hereditary) in the service of the Naiks or Zumeendars, in the Hydrabad territory, and they hold a considerable portion of land rent-free for their service, which is cultivated by some of the family. Besides they receive dues from the inhabitants, for performing the police duties of villages, and are employed in collecting the revenue and on "field service" when the Naik is engaged in hostilities, even should it be with the ruling authority of the country; on which occasions the Tellgolls were frequently in the habit of sending their families to the jungles for protection, while they showed the greatest zeal and most devoted attachment in the Naik's cause. Some of these people were formerly employed in the Poona subsidiary force, as pioneers, lascars and dooly bearers. A few of them are settled at Poona and Seroor as palankeen bearers. The Mootrassy passes under the denomination of Kamatty, at Poona and Seroor. The word Kamatty is applied, by the inhabitants of the Mahratta country, to all descriptions of persons coming from the Ballaghaut and the Hydrabad country who can speak Telingy, Koonbies, Mallies, &c. and even Mahomedans, are classed under the head of Kamatty. The Mahomedans in the country around Commummalt, Nullgoonda, Pochumchilloo, apply the term Koly to the Tellgolls. They worship all the Hindoo gods under the Telingy names of Eerranah (Mhadeo) Ellamah (Bhoany), Pochumah (Matta Devy); but their chief object of adoration is Narasingha, the man lion, being the fourth Avatar of Vishnoo.

settled in the towns and villages on the banks of the Godavery river, between Nassik and Gungakhere. They state that their ancestors came from Bundlekund in Hindoostan. They worship the god Ramah, and relate a miraculous story respecting their own origin. They say that they are not Kolies; the terms Dhewur and Kywurtuk are synonimous, and the Pooranæ state that they are the offspring of a Pursovah, a goldsmith and an Eeogvhy or female patruwut (a hewer of stones), who are to be employed as boatmen at ferries on large rivers. A few of them are employed at Ahmudnuggur and Poona as palankeen bearers.

The tribe of Mhadeo Kolies is divided into twenty four Kools, or grand division; each of these is subdivided into branches or classes, amounting in all at present to about two hundred and eighty. Each of these clans comprises many families, bearing the same surname; the number varies according to circumstances.

The following are the names of the Kools of the Mhadeo tribe of Kolies, with the number of clans or branches that have diverged from each :

	Clans.		Clans.
The Wunuckpall, from this have sprung	17	The Polewoss, from this have sprung	12
The Kodum	16	The Ottarracha	13
The Puwar	13	The Dulvy	14
The Keddar	15	The Goully	2
The Boodywunt	17	The Agghassy	3
The Namdeo	15	The Chowan	2
The Kheersagur	15	The Oojajy	12
The Bhagghywunt	14	The Sagur	12
The Bhonsla	14	The Shaikacha Shesha	12
The Jugtap	13	The Khurad	11
The Gykwar	12	The Seerkhy	2
The Sooryvaunssy	16	The Sew	9

Although it is impossible to ascertain who the original founders of each Kool or grand division might have been, we are, however, supported by traditionary evidence in stating, that persons of rank or influence in former ages, who might, from necessity, choice or other causes, have joined the Koly community, occasionally became, in such case, the founder of a new Kool. As a proof of this, it may be mentioned here, that the origin of the Lokkriah and Garriah clans of Kolies, who are numerous in the Ghore Nahur or valley of the Ghore river, is popularly accounted for in the following manner. A person named Batty Row Sirkhay (styled Rajah, and said to be connected with some of the powerful families of the name in the Dukhun), having been afflicted with a very terrible and most loathsome disease, repaired to the celebrated temple of the deity Wittoba at Punderpoor, and implored the god to

remove the terrible disease and restore him to health. The deity is said to have listened to his earnest entreaties, and recommended him to proceed along the banks of the Bheema, until he reached the temple of Mhadeo at Bheema Shunker, the source of the river; and that, if he paid his devotions deligently at the shrine of Mhadeo at that place, he might expect to find that the deity would restore him to perfect health. He accordingly commenced his journey towards the western ghauts. The jungles or forests in the vicinity were, in those days, almost impervious; however, Sirkhiah gradually advanced, and, when he had approached the hill near the temple, he discovered a cave, in which an old Koly and his daughter resided; he made up to this Koleen while her father was absent at the temple, and learnt from her that her father was the attendant of the temple of Mhadeo. However, to cut the story short, Sirkhiah recovered his wonted health, and became enamoured of the Koleen, who, in the course of time, presented him with a boy, and as the child had an unusual quantity of hair on his body, he was nicknamed Lokhriah, which, in the Mahratta language, means hairy. Tradition further says, that Sirkhiah invited many of his relations and friends to join him, and that he founded the village of Shawpoor; but, as he subsequently became a bold and daring plunderer, orders were given for apprehending him, and in an attempt to capture him he was killed. His son is supposed to have been the founder of the clan Lokkriah. The Sawunt Desmooka in Bhaumnhair have a copy of a document, dated Anno Hijera 827, corresponding with A. D. 1423, in which the services of one of their ancestors are commended by the king of Bedur, for having suppressed an insurrection caused by Batty Row Sirkhy, on which occasion the village of Irum was conferred on him in enam (free gift), and he was confirmed in the Desmooky of 84 villages. The descendants of Sawunt continue to enjoy these grants.

Were we to judge from the similarity, some of the names of the twenty four Kools bear to the present Kooṇby surnames, we might feel inclined to conclude that the Kudum, Gykwar, Puwar, Jugtap, &c. were apostate Koonbies who had joined the Kolies: but then it is to be recollected that these surnames are common to all the families of the very lowest classes of the community. The Chowan Kool is thought to be of Rajapoot origin, and the Namdeo Kool, it is conjectured, must have been founded by one of the Mahratee Namdeo Simpees, or tailors, as they are the only Kolies who abstain from killing sheep at their weddings, following the example of the Namdeo Simpees in this respect, who do not partake of animal food during the nuptial ceremonies, although they offer propitiatory sacrifices to their gods, some days previously. One of the members of the Memmy family of the Kheersagur Kool, who are Patells of the village of Kheeryeur, in Mherr Khora, some four or

five generations back, received a Bunjara boy into his family, and adopted him as his son, the boy taking the name of Memany. This circumstance has been the cause of much strife and quarrelling among the members of the family, the descendants of the Bunjara claiming the Patellship, while the lineal descendants deny their right, and upbraid them with the nature of their origin.

It appears that nineteen of the original names of the persons who were the founders of the different Kools of this tribe, have in the course of time become extinct: yet the numerous clans who have respectively sprung from each of them, carefully retain and cherish the name of their original founder. The Mhadeo Kolies are peculiarly tenacious of the Hindoo usages, of adhering strictly to established rule in forming their matrimonial connexions. For it is only persons of different Kools that can be united in marriage. Those of the same Kool, or original family stock, are prohibited intermarrying. It is a common observation, that, were persons of the same Kool to marry, the circumstance would entail much unhappiness and misery on the parties, and that their offspring would never thrive. I know an instance of such an irregular marriage, and it is rumoured that the couple are very unhappy and have no children. The mistake occurred by the parties omitting to institute the necessary enquiries at the proper time.

The estimated number of the tribe—their Patells--the Revenue system, and grains cultivated by them.

It is said, the Kolies were much more numerous about seventy years ago than they are at present; that many of them were destroyed during the various disturbances that have taken place since then, and by the famine that occurred in 1803-4, and, latterly, by the cholera morbus. To afford a better idea of the amount of the Koly population at present, and to show how they are dispersed over the hilly tract, I will give the estimated number of their houses in each valley and glen.

There is reason to suppose that they were more numerous in former times, around Poona and the valleys south of Loghur fort. But, in the valley of the Moossa Khora, they have only thirty houses, and in the Mootah Khora they have also thirty houses, and forty in the Puwun Mawill; all of these are Oopry* cultivators and labourers, there being no Koly Thullkuries or Wuttundars so far south at present.

In the Andur Mawill there are sixty Koly houses; they are the Patells of two villages and share the Patellship of two others with the Koonbies.

* Oopry—a tenant, or one having no property in the soil; whereas Thullkury means one that has a right in the lands he cultivates.

In the Nana Mawill the Kolies have a hundred houses, they hold a share of the Patellship of several villages, and the Heemarrah Koly Naik, with ten men, is employed in the police.

In the Bhaum Nahir the Kolies have 45 houses, and they hold a share of the Patellship of two villages; but the Koonbies, who hold the other, are in a fair way of gaining the entire power, by forcing the Kolies from their houses. Much intriguing, and a great deal of villany, is often exercised among these people on such occasions. The Mettull clan of the Kedar Kool is the most common in this strath. The Kolies residing in four villages in the Koorah Barrah and Arrull Khorah have about 85 houses ; they hold half the share of the Patellship of two villages, the Koonbies hold the other. It is said that it is only very lately the Koonbies have unjustly secured the share of the Patellship for themselves. The Koonby, who now holds the Patellship of Kheirpoor, is a nephew of the Desmook of the district; he only took up his residence in the village a short time ago, for the purpose of grazing his cattle in the adjoining jungles. Although the title and a share of the office of Patell was conferred upon him, no enam land could be granted without the sanction of the government authorities; however, as the village Chougla died without any heir, the Desmook transferred his enam land to the new Koonby Patell. The Parday clan of the Gykwar Kool is the most numerous in this glen.

In Bheem Nahir, the Kolies are the only inhabitants of nine small villages, and in nine other villages they and the Koonbies hold each a share of the Patellship, the Koonby Patell takes the precedence of the Koly Patell in all the village affairs, which is a source of great vexation and complaint to the Kolies, as they declare the Koonbies have unjustly taken possession of these situations. The number of Koly houses here is estimated at 288, and the names of the Langly, Murkhy and Nanggry families are the most numerous.

In the Ghore Nahir, or valley of the Ghore river, and in the Ambygown quarter, there is a great deal of jungle. The Kolies are more numerous here; in forty villages they have nearly one thousand houses; and hold the entire Patellship of 35 villages and share that of five others with the Koonbies. The Koonby Patell's share of the village of Wuspah was purchased, only a few years ago, from the Koly Abbajee Singgariah, for the small sum of forty rupees. The Koly was involved in difficulties; his property had been distrained, to pay arrears of revenue; and, to get rid of his debt, he was persuaded to sell his share of the Patellship. The Koonby Patells of this quarter are constantly exerting themselves to dispossess the Koly Patells of their rights. This leads to incessant strife between the parties. The Koonbies using

their influence with the Desmook and Koolkurny to get them either for love or money to support the claims they put forth.

Three very small villages have been deserted in this quarter, within these last six years. In two of these there were only a very few inhabitants, and, as they had suffered much from sickness, they quitted the place. The third was deserted owing to a boundary dispute not having been satisfactorily adjusted. In the quarter called Ghora of this valley, there are one hundred Koly houses in six villages, and in one village they continue to retain a share of the Patellship.

The Koly Naik, Dada Baumlay of Bhoregur, is employed in the police with twenty-five Kolies. They have charge of the valleys, of the Ghore, the Bhaum and the Bheema rivers. The Naik's pay is 25 Rupees per mensem; the men receive four rupees each. The Lokkriah, Assaully and Bendery clans are the most numerous in this valley. In Meen Nahir there are 321 Koly houses in 17 villages. The Kolies hold the entire Patellship of eleven of these—the Patellship of five others they share with the Koonbies, and of one with a Mussulman. These are constantly squabbling, and claiming precedence of each other. The most common family names in this strath are the Neegly, Silkunda, Ballcheem, Borrorry, &c. In the Kookur Nahir the Kolies are the sole Patells of thirteen villages, and they share that of eight with the Koonbies. The number of their houses amounts to 316. The Toory Koly, Patell of Tejoor, and the Koonby Patell Khurrad, are always quarrelling. The Koonby is accused of having come to the village jungle to graze his cattle, and, by unfair means, to have usurped a share of the Patellship. The Sablah, Naggry, Dewtah, &c. are the most common family names in this strath.

Mhurr Khora.—The Kolies are the only inhabitants of five of these villages of which they are the Patells; in four of the other villages there are a good many Koonbies, but the Kolies are the Patells, with the exception of one, which they share with the Koonbies. In the village of Peeplegown the Koonby Jumdurry is the sole Patell. The family of Bhokkur, notorious among the Kolies as being one of their greatest chieftains, was Patell of this place, and resided here. It is known by the name of Peeplegown Bhokkur. It is said that the Bhokkur Naik fled, during an insurrection of the Kolies, when Nana Phurnavees was minister; and that the ancestor of the present Koonby Patell contrived then to secure the situation for himself. The present Koly Naik continues to claim the Patellship. There are 164 Koly houses in this glen.

The Bhokkur Koly, Naik of Mhurr Khora, with 25 Kolies has charge of the police of Meen Nahir, Kookur Nahir and Mhurr Khora.

In the Oottoor quarter the Kolies are the sole occupiers of ten villages, of which they are the Patells, and they share the Patellship

of twelve others with the Koonbies. In the 22 villages there are 394 Koly houses. Diggy Mally and Gondky are the most common family names.

In the Kotool Dang there are 840 Koly houses in 32 villages, and they are the Patells of 29 villages. In the Kotool puthar (plateau) and adjoining villages, there are 200 Koly houses. Between the Singgally Koly, Patell of Wanjoollsett, and a Telwur Kanara, who has claimed the Patellship for these 35 or 40 years, much enmity exists. The Koly's corn and sugar cane fields were lately destroyed by the Kanara's cattle. The latter has a little money, and bribes the Zumeendars, and by this means retains possession of the office he has usurped.

In all there are about 1,040 houses. Bhauggrah, Moottah and Heelah are the most common family names. Ballajee Bhauggrah of Khona, the hereditary Koly Naik of the hill fort of Koonjurgur, was appointed to the police of the Kotool districts, with ten men, a few years ago. He shortly afterwards died, and although his son ought to have succeeded him, as the Naik Rukwulldar of the district, another, but more wealthy, clansman, by means of bribing the Brahman agents, got confirmed in the appointment, to his detriment, and he is constantly complaining of the injustiee done to him.

In the Rajoor Dang, the Kolies inhabit 36 villages, and they hold the Patellship of 35 of these, and share that of the Kusbah of Rajoor (the market town) with the Bunjarrahs, who are settled there. Much strife and bad feeling exist between the two parties, owing to the rivalship between them about taking the precedence at festivals, and in other affairs connected with the village duties. The Desmook of this district is a Koly (the family intermarry with the Rajahs of Jowair) the surname Peechur, and the Bhauggrah family of Ekdurrah have been the Naikwarries for ages past. The present Koly Naik, Gungojee Bhauggrah, communicated information to me of a most important nature, relative to the movements of the rebel Kolies some years ago, for which he was handsomely rewarded by government. The number of Koly houses is estimated at 992. Bhauggrah, Peechur, Kudally, &c. are the most common names in the district.

The police of Rajoor and Malldesh is in the charge of the Koly Munsubdar Naik, Jowjee Baumlay, who has forty men under him; and the Sir Naik Bhauggrah of Sakurwary with twenty five; and the Khary Naik of Barrah with fifteen men.

In the twelve villages of Putta (under the forts of Ounda Putta) the number of Kolies' houses is about 163, and they hold the Patellship of six villages. The most common family names are the Tullparah, Duglah and Sablah.

The cattle, in the villages of the tract around the forts of Ounda Putta, are all singularly marked, being invariably spotted white and

black, red and white, or black and red. *Ounda Putta* means marks reversed, or upside down.

In Malldesh, the Kolies inhabit three villages of the Takeed Khora, of which they are the Patells; and they hold half the Patellship of two others. They have 269 houses in this glen.

In the Kounnaee Khora, the Kolies have 200 houses; they hold the entire Patellship of seven villages, and share that of another with the Thakoors. Amby Mohur rice, of a superior kind, is grown here. The surnames, Perrykur, Khuttelab, and Gubbalah are the most common.

In the Dharrun Khora the Kolies are the Patells of five villages, and hold half of that of another; they have 262 houses here.

In the Oondhwole Khora the Koly houses amount to about 217. They share the Patellship of six villages with the Koonbies. The two parties are constantly quarrelling about their rights in these six villages. It is said the Kolies were the sole proprietors of these Patellships some sixty or seventy years ago.

To the south of the hill fort of Trimbuk, in 14 villages, the Koly houses amount to 228. They are the sole Patells of eight villages. They share the Patellship of two others with the Thakoors, and one with the Telwur Kanarahs—surnames Gondky and Wagh.

In the town of Trimbuk and neighbouring villages, there are about 250 Koly houses of the Mhadeo tribe. Here some families of the Koly tribes from the northward are settled.

In the town of Nassik and its vicinity, there are about 200 houses of the Mhadeo Kolies, and, in and around the town of Sinnure, about one hundred, and about one hundred more settled in and around the town of Ankollah. In the Konkan, but chiefly in the Jowair district, there may be about 2,500 houses, and it is supposed that the Mhadeo Kolies, who are settled in Bombay as labourers, &c. have about one thousand houses there.

From the above we find that there are in the Dukhun about..	6,895
In the Konkan and Bombay...........................	3,500
In all about houses.......................	10,395

As two and three families reside frequently in the same house, if we take the average number at five for each, it will give us upwards of fifty thousand souls of this tribe.

The Koly Patell, or the chief person of the village community, has to perform the same duties in their small villages and hamlets, that the same officer has to execute in other parts of the country. They have to lend their assistance in collecting the revenue and other dues from the inhabitants of their villages, and to aid the police in their magisterial capacity. For the performance of this duty the government remunerate them by granting them a portion of rent-free land, termed

Passoury,* which varies in quantity, from about 100 begahs, to half, a third or a quarter of that number, according to the size of the village and supposed responsibility of the Patell. He also holds a portion of Meerassy-land for which he pays rent.

From the inhabitants he receives the following perquisites or dues. Every householder presents him with one fowl annually, and every farmer gives him one seer of ghee; if the farmer is very poor, the Patell will be content with a half or quarter seer. Each farmer presents the Wannolla (a sort of friendly offering) at the harvest time; this is a little of the produce of his fields, which may be about a paillie, or four seers. Should the farmer have a large quantity of rice, nagly and koorachny, the Patell will take about four seers of each, and one or two seers of any other grain he may have grown.

In such villages or kushbahs, where fairs or markets are held, once or twice a week, the Patell is entitled to a small quantity of the vegetables and fruits brought for sale. From the venders of uttur (essence of roses, &c.) the Patell occasionally claims a narrapoorah; this is a small packet containing a little koonkoo, missy, abheer, hul'd, goolloll, and frankincence, each tied up separately. This is brought into requisition after the birth of a child, when the mother takes the packet to the temple of Sutwaie,† when it is placed before the shrine of the goddess, along with the offerings, and she is invoked to bestow her favour on the infant. If there is a bunniah (a grocer) in the village, he presents one soopary (nut) and a little tobacco daily to the Patell, but he has to send for them. He also receives one seer of coarse sugar at the Dussera, Hooly, Dewally, and a few other festivals.

The Patell's rank entitles him to the Maun or precedence at all public ceremonies connected with their customs and habits. If there be a mochy in the village, he must present the Patell with a pair of shoes annually at the Dussera. On the occasion of a marriage, or the naming of a child, the Patell receives a soopary (nut). When sacrificing the sheep at the Dussera he begins the ceremony. Also in the month of Jesth, when the villagers kill a young buffalo, to propitiate Bhoany, the Patell goes through the ceremony of wounding the animal slightly (in any part of the body) with his sword. He is entitled to certain services from the village Mhars.

The Desmook of the district enjoys a few begahs of land-rent free, and receives a Bheut rupee from each village in his district, besides he manages to get an additional rupee from each, as a substitute for a Passoury, which he solicits the people to give him. One seer of ghee and

* Passoury means two pieces of cloth that are stitched together at the sides, and then doubled over, and stitched all round, and is used as a wrapper.

† The goddess that presides over childbirth.

a fowl is also presented to h'm annually by each village, as well as the Wannolla of rice varying fron. four to sixteen seers, according to the size of the place. The Desmook receives from government three per cent. on the revenue of each village. The Desmook sends a sepoy to the different villages for these articles, and they are transported to his house by the village Mhars.

The Desmooks originally were the hereditary collectors of the revenue of their respective districts, which they paid into the government treasuries—owing however to their great dishonesty, and having been guilty of embezzlement, and corruption in the performance of their duties, they do not appear to have been employed in the fiscal department for a very great number of years. As they are in general very intelligent persons, and possess much influence in their districts, I suggested to government, about six years ago, the advantages likely to arise from engaging their services to some extent in aiding the police of their districts, thinking them fit instruments to be employed in assisting the government agents in maintaining the tranquillity of the parts of the country in which they resided, to prevent gang robberies, &c. Lately, they have been called upon to communicate information respecting the state of cultivation in their districts, and to encourage the extension of it.

The Naikwary of Rajoor.—This office has been held, for many generations, by the Bhauggrah Koly family of Ekdurrah. This appointment was instituted for the purpose of watching the agricultural interests of the district. The Naikwary was constantly on the move, visiting every village within his range, and seeing that the cultivation was not neglected. If any of the cultivators were unable to carry on their farm, having lost their bullocks or incurred any heavy loss or expense, the Naikwary obtained an advance of money for their use from the government, or in some other way enabled them to go on with their labours. If a cultivator absconded, owing to his having been oppressed by the Patell or other persons, the Naikwary had to discover the place of his retreat; and it became his duty to bring him back to his village, and to settle any quarrel that might have existed between him and any of the villagers; the Naikwary warned the Patell against his behaving ill towards this man, and he explained to the villagers that if, in consequence of their threatening or maltreating him, he absconded a second time, the inhabitants would be obliged to make up the loss by paying the rent of his fields to government.

Should the man have absconded to escape paying his rent to government, the Naikwary went in search of him and persuaded him to return to his village. The Naikwary, accompanied by the Desmook, the Despondiah and the Koolkurny, also by the absconder, then proceeded to the Soobahdars, when the Naikwary explained matters, and became security for the good conduct of the absconder. The Naikwary had to re-

port to the government authorities all irregular conduct on the part of the Patells, and others towards this man after his return to his village.

The Naikwary's perquisites consisted of from 16 to 24 seers of grain from each village according to its size; also a seer of ghee, a fowl and one rupee in cash. The Naikwary's services are dispensed with at present, and they no longer receive the dues of their office; some of them occasionally endeavour to levy a few annas or a rupee from the people.

The Koolkurnies (the village registrar or notary) and Despondiahs (the district record keeper) being Brahmans, there is little occasion to say much about them. They exact in some places a seer of grain for every rupee of revenue paid to government; also a seer of ghee and a rupee on account of stationery, from each village. The Despondiah and the Koolkurny receive 2½ per cent. on the amount of revenue collected annually. These men, having charge of the village allowances, deducted from the revenue for discharging the various public expenses of the village, contrive to embezzle a portion of it; they also plot and intrigue with some of the Patells and Desmooks to deceive the government Shaikdars and Mamlutdars, with respect to the amount of money actually realized, by returning some of the cultivators as dead, absconded, or as paupers, and exhibiting a false return of the quantity and quality of the land actually cultivated. There are instances of the Koolkurnies in the hilly country overawing the government agents, and completely thwarting them in their endeavours either to ascertain the real state of the districts or afford any redress to the complaints of the people. However they have considered it adviseable to conciliate such of the Mamlutdars as were of a fearless character and a meddling disposition. Such matters are commonly arranged with comparative facility among Brahmans, by which both the people and the government are frequently defrauded. It is seldom necessary to grant any remission (abatement) of the revenue to the Koly population, as the supply of rain in the hilly districts is pretty regular, but when this takes place, little or no benefit is ever derived by the wretched Koly from this act of generosity on the part of the government. The intermediate parties divide the amount among themselves, and the probability is, that the man it was intended for never hears any thing more of it. At all events, if he is sufficiently daring to question them upon the subject, some perplexing statement is read or explained to him, which compels him to remain silent. It is to be hoped that the spread of education will gradually ameliorate the condition of these ignorant, impoverished and much oppressed people; that it will diffuse among them a more elevated tone of moral feeling and moral courage, and enable them to assert their own rights by disclosing and checking the numerous irregular and fraudulent acts, of which the village and district officers, as well as the government agents,

are so often guilty, when collecting the revenues of the state, and distributing justice to the vast population of its extensive territory.

The inhabitants of this part of the country (Rajoor, Malldesh, &c.) assert that their village lands were never measured, that the size of the patches of arable land was determined merely by estimation, and a certain number of these patches, or thikkas,* according to their dimensions, were considered to constitute a chour, or measure of one hundred and twenty begahs of land.

The revenue is therefore adjusted according to the ooktty or contract principle, but several modes exist under this head. First "the thickka bundy system," or patches of an estimated size and value—secondly "the outh bundy," or quantity cultivated with a plough either with two, four, or six bullocks,—thirdly, "the Dullie," or plots of ground cleared and prepared by means of the hoe or koitta.

A few poor Kolies (but much more frequently the Thakoors) cultivate small patches of ground with the hoe, or koitta, on the summits or declivities of the hills that are inaccessible to the plough; this the people term Dullie. The ordinary rent levied from a man for the extent of ground he can cultivate with the hoe is one rupee, and from a woman half a rupee annually. If the man and woman labour together, and the spot they cultivate is rather open, and the soil tolerably good, they will have to pay two, and sometimes three rupees. In the months of December and January they cut down the trees and bushes in particular spots, on the summits and the declivities of many of the hills, and when these have partly withered and the surrounding grass has become quite dry in the hot weather, they set fire to it, and after the first fall of rain, generally in June, when they have had a few fair days, they sow nagly, khoorachny, sawa, and wurraie broad cast. They endeavour to cover the seed with the ashes and a little earth, by scratching and drawing lines in a zigzag manner with the hoe.

The outh bundy system.—As the ground has not been measured, the Kolies sometimes pay their rents according to the quality of the soil and the quantity they can cultivate with a plough with four bullocks; for the best description of soil they pay 28 rupees annually; for medium soil from 18 to 22 rupees, and for the third or inferior sort sometimes only from 8 and 10 to 12 rupees. With a plough of four bullocks, a man will cultivate from 30 to 40 begahs of land. A plough with two bullocks will of course only have to pay half of the above rates, while one with six bullocks will have to pay half as much more.

In the low grounds, and along the banks of rivers or streams, there are patches of land composed entirely of black earth, and others of

* Thikka, meaning a patch or lot, is a different word from the term Tukka, which means a few copper pice, and is applied to a measure of land in some parts of the country.

different mixtures, which vary much in quality; these are frequently classed under the term thikka, as well as the Mallzumeen (that is, the more elevated, less fertile, stony, red soil, clear of jungle) but the most productive and highly valuable lands are the thikkas, which have been divided into bhautt churries, or rice fields, and that have been chiefly formed by artificial means, on the shoulders of some of the more shelving and gently sloping hills, and in small ravines or gullies, by building a succession of bunds on imbankments across them, at suitable distances, and filling up and levelling the intermediate spaces. Erecting these imbankments, for sustaining the earth of each plot, must have been a work of immense labour and fatigue, for they are principally composed of very large stones. Contsant attention is required to be paid to them during the monsoon, to prevent the torrents that rush down the sides of the hills from destroying the fields and removing the materials of the imbankments. The dark reddish soil of these bhautt churries is very rich, and productive, being fertilized annually with a fresh supply of a mixture consisting of the debris of rock and decomposed vegetable matter, washed down by the monsoon rains.

The finer and better varieties of rice, which are so much esteemed and prized by Brahmans and wealthy natives, are grown in the greatest perfection in these fields. The owners of these thikkas that are divided into bhautt churries, are allowed to cultivate a certain portion of the adjoining Mallzumeen, as they pay no rent for the usufruct of it, the cess on the bhautt churry originally including such an arrangement. The rent of each thikka varies from 2 to 10 rupees, all depending on the estimated size, &c. of the different plots.

Should a poor Koly, for want of means, forego cultivating his bhautt churry, he will very likely cultivate a portion of the Mallzumeen attached to it, for which he will pay two or three rupees. All the bhautt churry thikkas, as well as those of the Mallzumeen, &c. have names of long standing. The rent of each plot has never been altered within the memory of man. The only time when they try to effect a change, is when a man has laboured hard to clear a patch of the Mallzumeen, in which he sows the coarser descriptions of rice (takia, dhoull, &c.) which he can irrigate from its vicinity to a stream, should there be any scarcity of monsoon rain. The rent of such a plot is raised on this account, but the Koly will struggle to retain it at the rate he had previously paid, not considering it worth more to him. In the event of this being denied to him, he will threaten to quit the village,* and often

* Some years ago I took the liberty to recommend that the assessments on the lands in the hilly country should be lessened, were it only for a period of a few years, as the arrangement might tend much to induce the Kolies to remain in their own villages, and wean them from their wandering propensities, at the same time to guard against the Koonby farmers of the plain settling in the Koly villages. A system of much forbearance is required to be pursued in collecting the revenue, where such poverty exists, and where such injurious consequences are likely to result.

moves off to a distance to escape from his creditors, and to avoid paying his arrears of revenue to the government agents.

During the period that benefactor to his country, and most able and intelligent minister, Nana Phurnavees, was supreme in the management of affairs in the Mahratta government at Poona, he issued orders to the revenue officers, to hold out every inducement to the Kolies, and other inhabitants of the hilly country, to extend the cultivation, and to grow the finer sorts of rice, on a more extended scale, as the soil and climate of this tract appeared to bring these grains to such great perfection. And as the labour and expense of forming new bhautt churries, or rice fields, in the most desirable situations, would be attended with a considerable outlay of money, advances of cash were made to the people to enable them to form new fields, and repair the old ones, which were in such a very dilapidated state at the time, owing to the anarchy and confusion that had extended to this part of the country, when many of the Kolies had neglected their fields, and many families had been destroyed. The money advanced was to be repaid to government by instalments at a very easy rate.

The Kolies are much in want of such encouragements at present; for some of their fields are neglected, and others out of repair. The chief object ought to be to extend the number of their rice fields, which would ensure a more extensive cultivation of this grain. The interests of the government, as well as that of the people, would be much benefited by such an arrangement.

Notwithstanding there is a much greater fall of rain in this tract than in the open country, to the eastward, yet, owing to the rocky nature of the hills, and the little depth of soil in the valleys, the supply of water during the dry season is often very inadequate to the wants of the population. I have known several instances of the inhabitants of some villages, having to go to the distance of two and three miles for water in the hot weather, and what they procured was stagnant and filthy, from a pool in which buffaloes soaked themselves; so that it was with the greatest difficulty a person could drink it.

The following are the various sorts of grain cultivated by the Kolies. Rice, bhautt, tandool—first, that known by the name of Amby Mohur, is a small grain, but a superior description of rice; it is high flavored, rich and pleasant to the taste, consequently much esteemed by Brahmans, and wealthy natives. The Kolies in general sell it to the Bunniahs, at the rate of twenty seers (forty Bombay) the rupee. It is retailed in the Poona market from 12 to 15 seers per rupee, and from eight to ten seers the rupee at Ahmudnuggur. Cheemun sall—this is a much esteemed rice, being also a small and fine grain, but has no flavour—it sells at the same rate as the Amby Mohur. Jeery sall—this is also a fine grained rice, and highly prized; it sells at the same rate as the

amby mohur. Krishen Sall—this is a coarser description of rice, and rather dark. It is called the black rice, and sells about twenty-two seers for the rupee. Kummode—this is a large grained rice, it possesses a high flavour, and is much sought after, as it is in general cheap, selling about twenty-four seers for the rupee. Raie Bhogg—this is a rather common rice, grain of a medium size, has little flavour, sells at the price of the Kummode rice. Sukwar rice—this grain is of a medium size, has no flavour, but is rich and glutinous, sells about twenty seers the rupee. Wurrunggull—this is a rather large grain, is coarse and tasteless, sells about twenty seers the rupee. Takkia—this is a large coarse grain. It is very insipid, sells from twenty-eight to thirty-two seers the rupee. Some of the poorer Kolies make it into bread. Dhoull rice—this resembles the takkia rice very much in being coarse and tasteless, and sells at the same price.

These three latter grains are sown on the malkumeen, where it can be irrigated by some passing stream, otherwise they must depend on the monsoon rains. These coarse kinds of rice are sown early in June, after the first fall of rain, and ripen in September, and are consequently called hullwa, meaning early; while the finer kinds take longer time to attain maturity, and are called gurwah, or slow. They are also sown in June, and pulled up in July or beginning of August; the roots having been well washed, they are replanted in the bhautt churries, or fields prepared for their reception, and cut down in November. The operation of transplanting the rice into the new fields, is not only an important, but a tiresome and most fatiguing one. The new fields require being well soaked with water, and the earth softened, so that when the hand is placed on the surface it produces an undulation like a bog. The men and women employed provide themselves with small stools to sit on in the midst of this sheet of mud. It frequently rains all day, and they are teased in a distressing manner during the time by musquitoes, gnats, &c. A few weeks after this, when it becomes necessary to weed the rice, all engaged in the labour keep a cowdung bratty (cake) burning near each, that the smoke may assist in driving away these tormenting flies. Men and women use a description of covering of leaves and split bamboos, made to fit the body, and termed yearlah, to shelter themselves on this and all occasions from the rains. While weeding, it requires no small ingenuity to keep the piece of cowdung burning, owing to the rain and wind: they therefore are frequently obliged to keep it inconveniently close to them.

The Kolies dispose of the different kinds of finer rice to the Bunniahs or grain merchants, retaining only a very small quantity for their own consumption, on the occasion of particular festivals, and when visited by any friends to whom they are anxious to shew attention.

Nagly (*Cynosurus Coracanus*)—this small grain is sown broad cast, chiefly on the rough ground (dully), prepared for it with the hoe,

on the tops and declivities of the hills, when the cloudy weather begins, and a few days before the setting in of the monsoon rains. Some of the Kolies sow at the same time a few seers of nagly, in a field that has been well manured with ashes and dung, and, in the month of Ashar (end of June or beginning of July), they transplant it into other fields in the mallzumeen, and, should the plant appear to be growing up too rapidly, for the purpose of obtaining a richer ear, the plough is used, and a plank is subsequently dragged over the corn, which presses it down, and checks its growth for some little time. It ripens in the end of October and beginning of November. Nagly bread is one of the principal articles of food of the poorer Kolies.

Khoorachny (*Verbesina Sativa*) is sown on the hills and mallzumeen in Jest and Ashwin. From this an oil is expressed, which is used for their lamps and in their food—the Pend or oil cake is very nourishing, and given to milch cows and hard working bullocks. Toor (*Cytisus Cajan*)—the toor (dholl) grown here is of the same kind as they have in the Konkan. It is sown in the same fields with nagly, in the mallzumeen, before the first fall of rain in June, and ripens in December and January; used as dholl. Rahlay (*Panicum Italicum*)—the Kolies sow a little of this small grain for their own consumption. Bhadully (*Paspalum Pilosum*)—this is sown after the first fall of rain. They eat this, prepared as bread, and boiled as rice. Sawa (*Panicum Miliaceum*) —this grain is sown broad cast, on spots of ground cleared for the purpose, on the tops and sides of some of the hills, also in the mallzumeen. It is sown early in June, and ripens in August. This is prepared somewhat similar to rice. Rajgeera (*Amaranthus polyganus*)—the seed of this plant is sown in June and ripens in December. This grain is eaten on fast days, being prepared as flour; it is mixed up with milk on such occasions. Waall (*Dolichos Lablab*)—the Kolies grow small quantities of this pulse which they use like split pease. Wheat (*Triticum Monococcum*)—Gowho—the Kolies sow the katiah wheat and pottah wheat, gowho, in the bhautt churries, in the end of November and in December, and it ripens in January and February. They keep the wheat for some merry making, or for festivals. Oordiah (*Phaseolus Max*)—they prepare, and use this as dholl, or split pease, for soup, in which a quantity of red pepper and salt are put. Hurburrah—known also by the name of chinna, (*Cicer arietinum*)—this grain is termed Bengal horse gram in some parts of India. The Kolies sow a small quantity of it in their bhautt churries in October and November, it ripens in January and February. Mussoor (*Ervum Lens*)—a small quantity of this pulse is sown after the termination of the monsoon. It is used as split pease. Wattanna Pisnur Salwun Pease—the Kolies grow a small quantity of pease in the cold season—the pea is very small and used as dholl.--Kodroo (*Panicum frumentaceum*)—this small seed

is cultivated on the hills and in the mallsumeen; it is prepared and eaten after the same fashion as rice. Mukkah *(Zea Mays)* or Indian corn—a little of this grain is sown in June, and sometimes in December—it ripens in three months. The Kolies prize the ears much when toasted. Ambarry *(Hibiscus Canabinus)*—this is sown at the beginning of the monsoon. Some of the poor people eat the seed, mixed with other flour, the leaves are very bitter, but when mixed with red pepper and salt, it is much eaten with bread. The stalk is soaked in water and used as hemp for making ropes, &c. Tag, *(Crotalaria Juncea)*—this is sown in the beginning of the rains, and ripens in November and December. The stalk is used as hemp, for making ropes and a coarse material for bags, used by the Banjarahs for grain, salt, &c. and they feed their cattle on the seed. Sugar cane—Mahratta, *Oos*—they plant the canes entire, and close to each other (that is the end of the one joining the other), in the bhautt churries, which have been well manured and prepared for the occasion. This is in the month of October or November; the dew during the cold season keeps the soil moist, and the cane shoots up six or eight inches before the Hooly (at the vernal equinox). The cane is cut down in the following December—cane, grown after this mode, is said to produce sugar of a much better description, than that constantly watered from a well or stream. Jowarry and bajeere are not cultivated in these hills. The Kolies bordering on the plains, grow some bajeere.

They cultivate a few of the vegetables and legumes, commonly grown in the open country. Their jungles supply them also with a great variety of vegetables, from twenty to thirty sorts, besides fruits, berries, &c. The principal jungle roots are the anway, kaudur, chaie, sardull, pundah and turpull. The anway grows in the hardest red soil among the rocks, and consequently it is a difficult and laborious task to dig it up. In appearance, and in many respects in quality, it resembles the yam. The root is found from one to two feet buried in the ground; it sends forth a shoot like a creeper, which clings to any bush or tree near it. The substance of this plant is white, and it is boiled in milk. The natives of rank prize it much. The plant of which arrow root is made, grows abundantly in the hills and near some of the villages. The Kolies call it Sillinda, but they do not use it for any purpose.

The kaudur resembles the plantain tree. The root is much eaten by the Thakoors and some Kolies during a scarcity. They also eat the root of the turpull, pundah and chaie, when grain is dear. The sardull is a large bulbous root, and is also eaten by the Kolies in time of scarcity; it is extremely rough and unpleasant to the taste. They use it also to cure the guinea worm.

Their character and habits, &c.—From what has been stated it will be seen that the Mhadeo Kollies, must be considered a strictly agricultural people, and in general they appear to be well acquainted with the usual system of husbandry of the country. Many of them are hard working and diligent in their farming pursuits, and are consequently placed in pretty easy and comfortable circumstances, compared with a large portion of them who live in the greatest distress and poverty. Although the Kolies are quick and possess a good deal of shrewdness, they are not so steady and intelligent as the Koonby cultivators of the plain, being generally disposed to be more indolent, thoughtless and improvident. No doubt local circumstances, the influence of climate and the nature of an oppressive government, tended much to induce unsettled and predatory habits among them. A few of the most ignorant and destitute frequently quitted their homes, and fled to a distant part of the country, to evade paying their rents or adjusting their accounts with their creditors; while some of the most dissolute, who preferred leading a life of idleness, and enjoying such comforts as a little money only could procure, were in the habit of stealing privately to supply their wants, or joining a party of their kinsmen on a plundering excursion, most commonly into the Konkan, for they always have been a most determined and desperate set of robbers.* However, within these few years, they have been greatly restrained, indeed nearly weaned from this wicked propensity of helping themselves to the property of others. Generally speaking they are not so stout and robust in their persons as the inhabitants of the open country; their clothes, too, are of a coarser description and more scanty; but, in other respects, they differ little. In former days many were of a bold and high bearing; a spirit of great independence and freedom existed among them, chiefly inspired by their inhabiting a naturally strong and romantic country, where they could roam at pleasure, and enjoy the liberty their wilds conferred, by seeking refuge in their fastnesses, when they deemed it necessary to fly from the strong arm of power.

They may be considered a sober and temperate people, not being much addicted to the use of spirituous liquors; this, however, may be owing principally to their poverty. They are excessively fond of tobacco; they both chew and smoke it, and declare they could not exist without it—the elderly females enjoy this weed amazingly. Both men and women consume an immense quantity of red pepper in their food,

* They were in the habit of torturing persons they seized, in order to extort money from them. I recollect seeing the Patell of a village near Trimbuk in 1819, who was cruelly burnt by the members of a gang with the matches of their guns, as he refused giving them three hundred rupees. A man, the same gang had previously seized and treated in a most shamefully cruel manner, died in consequence.

conceiving that something heating is necessary, in the moist and cold climate of their hills during the monsoon.

The Kolies are rather apt to accuse each other of being faithless and cunning; they seldom communicate their intentions of a private nature to any friend. They also bear the character of being very revengeful, and gladly, but patiently, await an opportunity of secretly indulging their vindictive passions. But one of the most odious features in their character, is the envious spirit said to be more or less common to them. Any unusual superiority, good fortune, or happiness, visible among any of their kindred, kindles a feeling of such malicious envy in their bosoms, that they are frequently urged on to attempt, by some secret means, to lessen the happiness of the object of their hatred, by mixing some deliterious matter in his food, which may either kill him or render him an object of pity, during the rest of his life (this is supposed to be effected by magical powers); or they will injure his cattle, or set fire to his house, when it is well stored with grain.

Notwithstanding the Kolies exhibit so many vices in their disposition, to which the common ones of falsehood and deceit are to be added, yet, in their intercourse with each other, as members of the same village community, they in general bear a pretty fair character for honesty and plain dealing, and their readiness to aid and accommodate each other at particular seasons seems mutual.

Being thoughtless and imprudent, they are too easily misled by advice, that they ought without hesitation to disregard. The Kolies are readily elated with success, and, on the other hand, failure or misfortune greatly distresses them. They do not show great energy in contending with, or trying to overcome, calamity. In conversation they are very fond of using proverbs and similes. Very few indeed have received any education, or are able to write or read. Some are gifted with retentive memories, and although they are so illiterate, they appear to relate traditions connected with their own history with great precision. The animal perceptions of the Koly seem very acute, and their agility and speed are often very great.

Excepting the cow and the village hog, the Kolies eat all animal food; they are very fond of the wild hog, and occasionally contrive to kill it by pursuing and forcing it to leap down a precipice. It is a most exciting spectacle to see the inhabitants of two or three Koly villages, bounding with rapidity over the hills after the wild hog, shouting and cheering their dogs forward in pursuit of the game. The Kolies in the pay of government are armed with matchlocks and swords. They never appear to use the bow and arrow, although the Bheels in their vicinity scarcely use any other arms.

The Koly females are generally slender and well formed, with features of a pleasing expression. Some are very pretty. When compared with

the stout, robust, and often coarse, Koonby women of the plain, a very considerable difference is perceptible. Where so much poverty reigns, we cannot expect the females to be particularly well dressed. The Koleens in general have a very limited wardrobe—the whole consisting of little more than two or three sarhies (and these are often much worn) and about an equal number of cholies. They tuck up the sarhy, after the fashion of the women of the Konkan, so that it seldom comes down lower than the knee. They have few ornaments; a small golden nose-ring, and, probably, a small ring of the same metal in each ear, with two or three silver rings on their fingers. The wives of some Patells and of the Naiks, of course dress a little better than the other women of the village. Yet all the Koleens are, like most other Indian females, fond of ornaments and dress. As wives (notwithstanding the Kolies have sometimes more than one) there is every reason to suppose, that they are as faithful, and as much attached to their husbands, as those of any other tribe. That there are instances of infidelity among them cannot be denied; but in their small villages there are seldom, or never, such instances of highly degrading and immoral conduct to be seen as are so prevalent in the towns and villages in the desh, or plain. Indeed the Kolies, both men and women, appear shocked at the dissolute manners of the population of the open country. The Koly women have commonly very large families; but many of their children die in their infancy of the small pox, the measles and hooping cough. They are affectionate mothers, and, notwithstanding the very laborious life they lead, seem cheerful and happy. Their time is much occupied with their domestic affairs and out door work. In fact their drudgery seems unceasing.

They rise every morning at dawn, and often before that time, to grind the corn required for the days consumption; they then milk their cows and buffaloes, and assist in driving them out to graze; they sweep the house and frequently plaster the floor; their business is to bring water from the river, which is frequently at a considerable distance. Cooking provisions for the family follows—besides attending to the children, or nursing one of them. However, it is during the rainy season, that the heaviest share of labour devolves on the Koly females.* They have also to perform a most onerous portion of the field labour, as they assist their husbands in the harassing task of transplanting the rice plants, and, at a subsequent period, of weeding them and the various grain growing in the other fields. They likewise contribute their aid at the reaping season.

* In the months of August and September, the grass on the hills becomes very rank; that known by the name of Ghohona is said to possess a peculiar heating quality, and that the milk of cows and buffaloes that graze on it produces a great degree of stupor, and, on strangers, that it acts as a drastic cathartic.

It is the duty of one of the elderly females of the family to look after the dairy; as the milk in a few hours becomes sour in this country, the people for their convenience boil it. The Kolies for this purpose place their fresh milk invariably on a very slow fire, and it is gradually heated for several hours, when it is suffered to boil for a few seconds; after which, it is poured into flat earthen dishes, and some sour milk, or a little butter milk of the preceding day, is added, in order to thicken it; the following morning it is made into butter.* Once a week, all the butter that has been made is boiled sharply on a brisk fire, and strained while hot; when cooled it is termed ghee. They only make ghee during the monsoon and two of the cold months. Bunniahs travel about the country and buy it up weekly at a very low price.

As one of the days of the week is consecrated to each of the chief Hindoo deities, by their respective votaries, and kept as a fast, the Kolies dedicate one of their buffaloes or cows to these household gods, and all, who wish to be considered punctual observers of their religious rites, abstain from using the milk of the consecrated cow on these fast days. It is converted into ghee, and burnt in the evening, in a lamp placed before the family idols.

They sometimes burn some of this consecrated ghee near a precipice in the vicinity of water, to propitiate the tutelary spirits of the place to prevent any accident befalling their cattle, when descending into the bed of a river to quench their thirst.

To ensure the milk being readily converted into good butter, the Kolies insert a small piece of the bhoot khet tree into the slit end of the churning staff. This is supposed to possess the virtue of counteracting the influence of the evil eye (principally that of the females), and the machinations of the sorceress; therefore it is used for that purpose. When they fancy one of their cows has been enchanted, her milk driven away, or she objects to her calf sucking her, all supposed to be owing to the evil eye (especially of a female), they drive a peg, made of the bhoot khet tree, into the ground, to which they fasten the cow. This is said to act as a charm, the animal becoming quite submissive, and the milk immediately returning to her.

The Kolies are fond of charms or amulets. They believe, like many others of the inhabitants, that the tail of the chamelion possesses many virtues—that it will cure a fever of the tertian type, &c. &c. It is only on a Friday that they catch a chamelion they wish to destroy for the sake of its tail—they keep it all night in a pot with a little grain, and kill it on Saturday morning, when they divide the tail into

* The butter and ghee, made from the milk of the cattle which graze on the coarse grass of the hills, is considered of an inferior quality to that produced from the milk of cows in the open country.

little bits, and secure it in a small copper case. They, like the rest of the Hindoos, draw omens from the flight or passage of birds and animals. The circumstance of a crow, a cat* or a deer crossing a Koly, just as he has quitted his house, is considered unlucky; if they cross from the left to the right when he is proceeding on some important business, he will return and delay his departure for a few hours, or, probably, a day or two. However they sometimes rest satisfied with turning round on the spot they were standing upon at the time, and changing their shoes from one foot to the other, and then recommence their journey. A hare or snake crossing their path, either from the right or left, on similar occasions, they consider very unfortunate, and they will return home with the determination of deferring their journey; for they believe, that, if they should prosecute their journey after such an occurrence, they would not succeed in their object. When proceeding on business, they also have a great dislike to seeing the tass or Indian jay, particularly if it passes from their right to the left. If they happen to see this bird in front of them they will make an obeisance to it, and then pass on leaving it on their left hand. Meeting or seeing a jackal, is reckoned a very fortunate circumstance, when proceeding on business.

The Kolies seem to possess a little knowledge respecting the medicinal properties of the plants, &c. of their jungles and the mode of using them. They attribute much of their sickness (fever and ague chiefly) to their partaking largely of melons, gourds, mukka and vegetables, grown during the monsoon.

In fever cases they use the bhooie khollah, which is the name of the root of a creeper, known by the term peettanah. It grows chiefly in ravines that are well watered and shaded. The root is of a large white and bulbous nature, and they cut it into thin slices, and steep it all night in water; a little of this water is given to the patient to drink, and his arms and body are gently moistened with the liquid. They say it is only necessary to apply it a few times to cure a person attacked with fever. The leaves (large and round) of the peettanah are capital food for horses, rendering them sleek and fat in a very short time. The root of the kassada plant is also used in fever. It is an annual, and grows near hedges and dunghills; its leaves are small and resemble those of the tamarind tree; the flower is yellow and the seed is in a small pod, (there are two kinds of the plant). The root, after having been cleared of its bark or skin, is pounded, then mixed in a small quantity of water, and strained; a little is given in

* As the Koly habitations are much infested with rats and mice, they keep cats to destroy them; but the large owl of their forests is, again, a great enemy of poor puss—when opportunity offers striking her talons in her neck and carrying her off.

the morning, at noon and in the evening to the patient. A profuse perspiration is brought on, which tends much to produce an early cure. In very severe fever cases, it is given for several successive days if necessary.

In dysentery and diarrhœa they administer various medicaments. The fresh root of the bhooie sakly is pounded, and the juice expressed and mixed with goat's milk or with water. This is given for three successive days early in the morning, fasting. A little lime juice and sugar candy, to which is added some poppy seed that has been soaked all night in water, is mixed to form a paste, which the patient takes for three successive mornings. The root of the yell toorrah is prepared and administered in the same manner. The root of the ran (jungle) bheady (*Hibiscus esculentus*) is pounded and mixed with dhyn, or sour thick milk, and administered also.

They cure wounds of all descriptions by filling them or placing over them the pounded bark of the dhoully khurmutty tree—they also use the pounded leaves of the cully-tree for the same purpose.

To children they give a small quantity (a pice weight) of the juice of the oombre tree, they obtain this before sun-rise, by making an incision in the bark of the tree; this is mixed with an equal quantity of the mother's milk, and given for several days.

In cases of marasmus in children, the pod of a creeper, called the morrar sengh, is ground down in milk or water; and the fruit of the komballna (a bush) about the size of a small lemon, are mixed together, and a small quantity given to the young patient for three or four days.

They use various roots as purgatives. For the toothache they apply a small pill, the size of a pea, made of the leaves of the ran (jungle) moggury. This is laid on the diseased tooth; if it touches the tongue or gums it raises a blister.

They are much annoyed with rheumatic pains in December and January. To cure this they apply the actual cautery and burning turmeric.

Beggars are seldom seen in the small villages in the hills; it might therefore be supposed that the inhabitants were not often called upon to exercise the duties of charity; however, it is known that there are many indigent, blind, and sickly persons who are supported entirely by the bounty of their relatives, who are actuated solely by the praiseworthy motive of strong natural affection. Very possibly a spirit of ancestral pride might induce a few persons to bestow a little in charity to their poor connections, rather than hear of their subsisting by mendicity among strangers. To persons passing through their villages, they are generally attentive and kind, and they will permit them to occupy the small temple of the tutelary deity of the place, or some family will grant them leave to sleep in the shed adjoining their dwelling, in which their household gods are kept. The Kolies build their houses by erecting a number of posts, filling up the intermediate

spaces with wattle-work, plastered over with mud. The roof is thatched with grass. These dwellings, in general, are spacious, and commonly divided into several apartments. That in which the family usually assemble is the largest; the grain, stores, &c. are kept in another, which sometimes forms one of the sleeping apartments, and where the females retire to. Some of the cattle, especially the cows, are frequently kept in the dwelling house. The furniture in a Koly's house consists of two or three coarsely manufactured couches, used as beds; a few copper and brass pots for cooking and boiling water; small and large earthen pots for containing water, ghee, oil, spices, and a little grain. They keep their store of grain in large wicker baskets plastered with cowdung.

The Kolies pay their adorations to all the Hindoo deities, but their chief object of worship is Khundy-row, commonly called Khundobah. This is an avatar of Mhadeo, assumed by him when he destroyed the giant Munny Mull, and one of the most popular of the Dukhan objects of worship. His chief temple, in this part of the country, is at Jejoory. There is another of great repute at Bheema Shunkur, the source of the Bheema river—as this is in the tract inhabited by the Kolies, numbers of them attend there during the different festivals, especially on the Sheorattry, or night dedicated to Sheo, in the month of February. Bhyroo and Bhoany are also much worshipped by the Kolies. These three, and the derivative deity Heerobbah, constitute the Koly's household gods. They present offerings at the tombs of any Mahomedan saints, like the rest of the superstitious Hindoos, and at times they pay divine honours to persons whose existence may have been terminated in a violent manner, particularly if they, or their ancestors, were accessory to the event; in the hope of propitiating their favour, and that the past may be forgotten.

Their principal holidays are the Hooly, Dussera, &c. The Hooly festival is supposed to be in commemoration of the vernal equinox. The Kolies enjoy themselves greatly during this merry-making time. In many respects it may be compared to the Roman Saturnalia.

The Kolies commonly swear by Mhadeo and the bell bhundar, but the oath which they consider most binding, is that taken on the bank of a river, or near a well, when one of the party takes up a little water in the palms of his hands, and some bhundar, a few leaves of the toolsy, and of the bell, with a few grains of jowary are mixed; each of them pours this into the other's hand, at the same time imprecating evil upon themselves, if they act contrary to their declaration.

The Kolies generally celebrate the nuptial ceremonies of their children, when they are between the ages of six and ten years. The ceremonies attended to by them, correspond exactly with those performed by the Koonby cultivators (who are Shoodurs) on similar occasions. The expense incurred at a marriage by the poorer Kolies, varies from 15 and 20, to 25 and 30 rupees, and those in better circumstances

expend from 40 to 60, while a few of the Patells and Naiks will disburse a hundred rupees and upwards. Many of them too often involve themselves inextricably in debt when their children are married.

It is a common practice among the Kolies for their widows to enter into the matrimonial state a second time, conforming to the pot or mhotur ceremony.

When a woman abandons her husband, and takes refuge with a man of a different caste, the husband performs the kreea kurm, or breaks the murkhy (pot); that is, he performs all the funeral rites, as if she had died a natural death, after which he is at liberty to marry again. But if the woman leaves her husband to live with another Koly, the kreea kurm is not then performed. A woman eloping seldom marries her paramour, according to the mhotur ceremony, until after her first husband's death. Should a Koly die, who had been very much attached to his wife, and she marry again, and she or her husband be attacked by severe sickness, or any unpleasant occurrence befall them, a Bhuggut is immediately consulted, to ascertain what is best to be done to restore health and peace to the family. The Bhuggut will most probably declare that the woman's first husband has caused the affliction, but, if suitable peace offerings are made by way of atonement, the distress and vexation complained of will be removed. She will consequently entertain some of her friends, and bestow some trifle in charity, besides having a small silver image (of the value of a rupee) made up, which ought to be a likeness of her first husband; this is cased in copper, and it is necessary she should wear it suspended from her neck, or place it with the household gods.

When a man dies who was never married, which among the Kolies seldom happens, they say an Attwor (unmarried) has died, and, unless offerings are made to his manes, previous to a marriage being celebrated in the family, it is said some great calamity will befall the bridegroom or bride; that they will be greatly tormented with sickness, have no offspring, or, in the event of their having children, that they will not be long-lived. Therefore to ensure happiness to the parties, a sheep or fowl is sacrificed as a peace offering, and a few friends are invited to partake of the feast. Should years have elapsed, and the family have removed to a village distant from that where the Attwor was buried, the party will go out into an adjoining field, to perform the ceremonial worship, before any stone (a substitute for the grave of the deceased), upon which some bhundar and koonkoo, &c. have been rubbed, and some jowary and a soopary nut placed. These articles and a burning lamp had previously been put into a flat brass dish, and carried to the spot by a female, over whose head four men held a stretched sheet by way of canopy; a boy holding a naked sword in his hand, and sitting upon a man's shoulders, follows the female, and he is made to shout and scream during the time the procession is moving.

The Kolies bury their dead, and observe the same funeral ceremonies as the members of the Shoodur tribe. The bodies of such persons as die of a lingering disease, also those who die suddenly, are burnt, their death being considered to have been caused by conjuration and witchcraft. They examine the ashes, either the same evening or the following morning, in the expectation of discovering some proof of the cause of the death; for they verily believe that if the deceased had stolen or unjustly retained any article of food or wearing apparel, &c. (and the owner of such an article consequently practised some necromantic pranks in order, that the thief or thieves might be visited by some affliction), that a small portion of the said article, enveloped in a part of the intestines, will remain unconsumed by the fire, and will be seen smoking when the rest of the body has been reduced to dust. If the friends of the deceased are satisfied that, by the magical powers of the owner of the article, their friend was put to death, they seized the supposed murderer, and reported the particulars of the affair to the government agents. If the man or woman, thus apprehended, could bribe the influential persons in the district, the affair terminated here; otherwise the magician was kept in confinement in one of the hill forts for some time.

Many of the Kolies experience a considerable degree of uneasiness and alarm, lest they should some time or other, incur the displeasure of some of the magicians* or witches in their neighbourhood, especially the Thakoors and their females, who have the credit of being very great adepts in the necromantic art. In such a state of society, we need not be surprised at hearing of such things, for history informs us, that the Egyptians, Jews, Greeks and Romans, also people of more modern times, believed in the reality of demoniacal possessions; that they supposed spiritual beings did occasionally enter into the sons and daughters of men, and distinguished themselves in that situation by capricious pranks and acts of wanton mischief; in fact, that they afflicted men and cattle with diseases. All nations and tribes immersed in ignorance and superstition, have much the same notions on this subject; the faith of few people is more staunch in the belief of such things than that of the Kolies.† Whatever malady man, woman or child, or even their cattle, may be seized with, the

* There is a Koly family, consisting at present of several brothers, living in a village a couple of koss from Kotool, who are considered great bhootallies, or conjurers. They have the credit of having committed the most atrocious acts; any of their neighbours, who molest or annoy them, they distress at a most unmerciful rate. They destroy and lay waste the corn, the sugar cane and produce of the fields, of persons they dislike. Those that have attempted to make a stand against their evil practices have been forced to quit their homes, although they have expended money (in vain) to bribe persons of influence, in the hope of overthrowing the bhootallies. It is said that the members of the family, for a series of generations, have possessed this influential power.

† All the Hindoos and Mahomedans appear to dread the influence of incantations, and implicitly believe in the mischievous effects of the evil eye, the existence of ghosts and the power of witchcrafts.

Kolies imagine it is produced by the agency of some evil spirit or offended deity, and, after some time, having in vain attempted to cure the disease by the application of such medicinal remedies as they may be acquainted with, they consult some Deolushy, or an exorcist (or caster out of evil spirits), regarding the matter. The chief person, or any male or female, of the family, goes to the residence of a Deolushy,* (there is not one in every village), to beg, he will give his advice and assistance in removing the infliction with which they have been visited. The Deolushy is the Bhuggut, or attendant of the gods Khundobah, Bhyroo, Bhoany and Heerobbah. He makes minute inquiries, or affects rather to do so, respecting the nature of the sickness, and when all the necessary information has been communicated, he tells the person applying for his aid to go home, and to return to him the following day; that he will in the mean time consult his god, and that when he comes back, he will inform him what steps it will be necessary to take, in order to procure the wished for cure. When the person arrives on the following day, the Deolushy tells him that his family have neglected, for a length of time, paying their adorations to his deity, Heerobbah, and vows that were made, have never been fulfilled, or probably the Deolushy will remark that Bhoany, or Khundobah, is offended with the family, and that they must pacify the offended deity by suitable peace offerings. Should the Deolushy have informed the person that Heerobbah was offended, and that some one of the family, or their cattle, was now suffering in consequence, and that they had better make the necessary sacrifices and offerings to appease the deity—he would be asked to say, in what number of days the disease could be removed. The Deolushy possibly says in 15 days, and at the same time, prescribes for the sick person, recommending that he should follow a particular regimen, &c. He then goes to the censer in front of the shrine of his deity, and takes up some of the consecrated frankincence ashes, and gives a portion of it to the man to be rubbed on the forehead of the invalid, and he blows the rest into the air from between his fingers. Vows are now made that the necessary sacrifices shall be made, if the sick person recovers, within the time mentioned by the Deolushy. In this case it is announced that the ceremony will be performed during a particular month (after the termination of the rains); should the Deolushy's prophecy not prove correct, no further notice will probably be taken of it. The Deolushy mentions at the time, that, in addition to the offerings made to Heerobbah, sacrifices must be made to the other household gods. When the time for doing so approaches, three or four sheep are purchased for the occasion, if the family of the invalid can afford to expend so much money. Then, on a Monday evening, at the going down of the sun, two or three sheep are sacrificed as a peace offering to

* Various castes follow this profession, goldsmiths, carpenters, smiths, Kolies, Thakoors and even Dheres; but, among all of them, the Thakoors are most noted.

the goddess Bhoany (Dewee), and the gods Khundobah and Bhyroo, and the Gondhul ceremony takes place afterwards. In fact, a number of the neighbours come and partake of this great and noisy feast, and on Tuesday morning, when the sun has risen, the Deolushy gives the signal for the sheep, set aside for the offering to Heerobbah, to be sacrificed. A number of the villagers assemble now, not only to partake of the feast, but to observe the Deolushy performing the ceremonies customary on such occasions. All the women and children are either directed to quit the house during the time, or they are sent to such part of the dwelling as may be to the westward and out of the way, so that their shadow* cannot fall on the place to be occupied by the Deolushy. Near the spot where the household gods are placed, a fire is kindled, and a pot placed on it, into which four seers of oil are poured. When the Deolushy enters the house, he sits down near the household gods; some of the family prepare some dainty cakes, and choice bits of the mutton, which are deposited on the ground near the fire; while others cook the rest of the meat, &c. on a more extended scale. A band of musicians seat themselves close to the Deolushy, who now commences his operations. He is anxious to exhibit himself as if inspired, and to satisfy them that he has succeeded in getting the deity Heerobbah to enter into his person, he writhes his body about, casting his arms backwards and forwards, screaming and groaning, and shaking himself violently; in fact it might be supposed he was seized with strong convulsions; his hair is loosened, and hangs over his face and shoulders, so that he has much the wild, yet drowsy, appearance of a person overcome and exhausted from the effects of some powerful narcotic. The drummers carry on a dinning noice all this time, and, as the deity is now considered to have taken complete possession of his body, and the oil is boiling hot also, the audience preserve a dead silence, and the master of the house informs the Deolushy that the pot is ready; upon which he gets up and calls out to the people to stand clear, as he is anxious that the proceedings should not be interrupted in any manner more, especially be polluted by any impure shadow. He then takes a handful of bhundar (consecrated turmeric powder) in his right hand, and in the left he holds a bunch of peacock's feathers (in the end of which the image of Heerobbah is inserted), and resting on his shoulder. After having once or twice passed round the fire place, he sits down, then runs his hand along the edge of the pot two or three times; after which he raises it a little and gradually lets the bhundar fall into the oil. He places the flat of his hand now on the boiling oil, and when he withdraws it, he jerks the oil off his hand into the fire, by which the flame is greatly increased. A portion of the cakes and meat, which had previously been deposited near the fire place, is now taken up by the Deolushy, and cast into the pot, and, when he conceives it is sufficiently cooked, he

* One of the superstitious ideas of the natives, is, that even the shadow of a female, unless when a child or an elderly woman, pollutes their gods.

searches about with his hand in the boiling oil, till he has found all he put in, after which the remaining cakes and meat are cooked in the same way. The guests having seated themselves on the floor, the members of the family, who had been very busy cooking breakfast for all the people present, are now ready to serve it out, and only wait to do so until the Deolushy presents each person with a small quantity of that which he cooked, and which is considered consecrated. When the feast is finished, the master of the house requests the Deolushy to say, if every thing has been properly conducted ; the Deolushy remarks that, as the sickness has disappeared, and the peace offering has been suitably tendered and accepted, they ought to show their gratitude to the deity, and be most particular in making him a similar offering every third year—at all events once in every four or five years. He particularly impresses on them the necessity of their acting conformably to this advice; he then presents them with some ashes from his censer, and tells them to rub a little of them on the forehead of the person that had been unwell, and to put a little into his mouth; he now receives a small fee, or is presented with a turban worth a rupee or a rupee and a half, and takes his departure.

If the Deolushy found the oil insufferably hot, when he introduced his hand, he called out in a stentorian voice that their proceedings had been polluted, and that they must recommence the operation. He would likewise show symptoms of disappointment and of great displeasure. If a spectator expresses his surprize at the Deolushy's hand not being burnt by the oil, the Deolushy takes his hand, telling him not to be alarmed, but to allow him to prove that the danger is not great. The man, to his astonishment, finds the boiling oil perfectly innocuous, and not warmer than fresh milk from the cow.

The Deolushy, being considered possessed with the god Heerobbah during this ceremony, and therefore gifted with oracular powers, if any present should have left relatives ill at home, or cattle sickly or dying, or should they have incurred any very serious loss or injury, they ask the Deolushy, to inform them of the cause for such misfortune. He tells them that Heerobbah is offended with them, or that they made a vow to Bhoany which they have neglected to fulfil; or he may say that his god is not displeased with them, so they had better consult some other deity.

The Deolushies are considered to possess specially the power of detecting the evil practices of witches and conjurers ; but, as they are not all equally talented and cunning in their art, their answers are not always received with implicit faith ; therefore if the conduct of a person is to be searched into, several Deolushies are in the course of time questioned, and if their answers corroborate each other, it is concluded that the conduct of the suspected person is such as to justify their shunning his society. They are also consulted about absent friends, and thieves, and the recovery of stolen property. The thief sometimes

throws himself on the mercy of the Deolushy, offers to bribe him to silence, and to restore the property, for which the owner also tenders a present. When a Koly has lost one of his cows, he sometimes goes to ask a Deolushy where he is to find the animal. The Deolushy, after consulting his deity, tells him to go in some particular direction, and that he will find the animal.

The following may be considered a singular case of apotheosis, and I relate it here as a Deolushy was consulted on the occasion.

A short time before the Mahomedans relinquished possession of the hill forts in the western Ghauts, there were two Kolies of the name of Dharrow Assallah and his son-in-law Dharrow Sablah, who had rendered themselves very notorious and troublesome by the daring robberies they committed in the Mahomedan camps. Orders were at length issued for apprehending them, or putting them to death, but, both of them being extremely active and cunning, it seemed a most difficult undertaking. Chappajee Bhauggrah, the Koly Naik of Sukurwary, was then employed at Joonere, and he was urged to exert himself to capture Assallah, and that he would be rewarded for his trouble if he succeeded. After many hair-breadth escapes, Assallah was surrounded, in the vicinity of Koomsett, near Hurrychundurgur, and stoned to death, as he was considered invulnerable to arms of all descriptions.

It is said Bhauggrah was much troubled after Assallah was put to death; a Deolushy or Bhuggut was therefore consulted to ascertain the cause of his distress. This man stated that the Naik was the principal instrument employed to put Assallah to death, and that the ghost of the deceased had on this account haunted him, and would continue to do so till measures were taken to pacify it, which would ensure peace and quietness to himself and his family. The Deolushy recommended to Bhauggrah to have two silver* images made, worth three or four rupees; the one to be a likeness of Assallah and the other of Sablah. After these were consecrated he was to worship them, and place them with his household gods. Two stone images were also to be made and painted with red pigment; these were to be erected on the different spots where the two Kolies were killed. Bhauggrah acted in conformity with the Deolushy's recommendation, and the eldest son of the chief representative of the family, worships these images and presents offerings to them on all festivals; and on the 2d of Magh offerings are sent to be presented to the stone image at Koomsett. At the celebration of a marriage in the family, the bride and bridegroom go to Koomsett, and prostrate themselves before the image of Assallah, and supplicate his blessing.

* The image in possession of the family is a small one of gold.

(To be concluded in our next).

XI.—*Essay on the Metrical Compositions of the Persians.*—*By Lieut.* T. J. Newbold, Aid-de-Camp *to Brigadier General* Wilson, C. B. *Member of the Asiatic Societies of Bengal and Madras.*

With the view of affording the general reader as concise and plain an outline of the art of versification among the Persians, as it will admit of, preparatory to a future more extended analysis, I will preface this paper with a few remarks on the structure of their metrical compositions, digested from several of the most approved Persian treatises on the subject, and divested as much as possible of those technicalities and over refined subtleties, with which their authors love to obscure and mystify the theme under discussion.

Poetry they define as a discourse that has been weighed, *Kalám-i-Mouzún.* The balance by which the due proportion of its component parts is ascertained is prosody. It must be composed in one of the fixed *Bahúr* or measures, and must rhyme.

The *Arkán* ارکان or poetical feet.

The *Arkán* form the poizes against which the words forming a metrical line are weighed. They are eight in number, and are composed of long and short syllables according to their vowels. By variety of arrangement and repetition they form,

The *Bahúr* بحور

The *Bahúr* are the fixed measures in which all Persian and Arabic poems are written. The original measures are nineteen in number. From these have sprung various others, minutely specified by the Persian grammarians : with an enumeration of these varieties I will not here fatigue the reader.

The subjoined note (*a*) will shew the names and order of the 19

(*a.*) The 19 original measures—*Bahúr-i-Núazdah.*

1 Tawíl	طویل	11 Makzab	مقتضب
2 Madid	مدید	12 Mohtabis	مجتث
3 Basit.	بسیط	13 Sari	سریع
4 Wáfir	وافر	14 Jadíd	جدید
5 Kámil	کامل	15 Khafif	خفیف
6 Hazaj	هزج	16 Karíb	قریب
7 Rijz.	رجز	17 Musbákil	مشاکل
8 Ramal	رمل	18 Mukárib	متقارب
9 Munsurij	منسرح	19 Mátadárik	متدارک
10 Muzaria	مضارع		

The 13th 14th and 15th of these measures are peculiar to the Persians and the five first to the Arabs.

original measures—the 8 *Arkán* or feet of which they are composed—the sounds or syllables forming the feet—and the mode of constructing a metrical sentence or verse on this treble base—together with the application of the *Arkán* in scansion.

The 8 poetical feet *Husht Arkán*—composing the measures.

1	Fa-u-lan	فعولن	5	Mu-fa-i-la-tun	مفاعلتن
2	Fa-i-lan	فاعلن	6	Mu-ta-fa-i-lun	متفاعلن
3	Mu-fa-i-lan	مفاعيلن	7	Fa-i-la-tun	فاعلاتن
4	Mus-taf-i-lun	مستفعلن	8	Maf-u-la-tu	مفعولات

The sounds—*Asúl* (lit. the roots) composing the feet.

Of these there are three denominations—viz. *Sabab, Watad,* and *Fásilah.* Of the first there are two kinds—viz. *Sabab-i-khafíf* and *Sabab-i-sakil*—*Sabab-i-khafíf* is a word of two consonants, the first of which is accented with a moveable vowel (*Mútaharrik*) and the last quiescent (*Sákin*) as کم *kam.* *Sabab-i-sakil* is when both are accented, as ازو Azo.

There are two classes of *Watad,* viz. *Watad-i-majmú* and *Watad-i-mafrúk*—*Watad-i-majmu* is a word of three consonants, the two first of which are accented with moveable vowels leaving the last quiescent, as علن *Alan.* *Watad-i-mafrúk* is also a word of three consonants, the first and last of which are accented and the medial quiescent, as راس *Ras-a.*

Of *Fásilah* there are also two classes, viz. *Fásilah-i-soghra* and *Fasilah-i-kubra.* *Fásilah-i-soghra* is a word of four consonants, the three first of which are accented with moveable vowels and the last quiescent as جبلن *Habalan.* *Fásilah-i-kubra* is a word of five consonants, the first four of which are accented and the fifth quiescent as سمكتن *Samakatan.*

The method by which the Persians form the light feet from these roots is based on the principle of equalizing quiescent by quiescent and vowelized (if I may so express myself) consonants.

For example—the foot *Mu-fa-i-lan* (No. 3) مفاعيلن as denoted by its vowel and quiescent marks, is composed of one *Watad-i-majmu,* followed by two *Sabab-i-khafíf*—that is to say, it comprizes in all seven consonants, the two first of which are vowelized; the third quiescent or gezmated (*Watad-i-majmu*); the fourth vowelized, the fifth quiescent (*Sabab-i-khafíf*); the sixth vowelized; the seventh quiescent (*Sabab-i-khafíf*).

The feet thus composed form in their turn, as above stated, the various measures in which poems are written. These are all minutely laid down and examples of the different metres separately adduced in the Persian treatise on the *Arspoetica.* For example, the measure Hazaj (No. 6.) consists of the foot *Mu-fa-i-lan* (No. 3) repeated 4 times in the hemistich; and the measure *Mutaddrik* (No. 19) of the foot *Fa-i-lan* (No. 2) the same number of times. The 2 following hemistichs, written in the above measures, may suffice to exhibit the use of these standards in versifi-

The *Misra* مصرع or hemistich,
is a single line composed in one of the nineteen measures.

The *Beit* بيت or distich,

consists of two *Misras* rhyming together (*Múkaffa* مقفى). Two *Misras* not rhyming are called a *Fard** فرد. For instance:

بيت

خداوند بخشنده دستگير

كريمي خطا بخش پوزش پزير

Beit.
Khudáwand, Bukshindah wa Dastagír
Karími, Khatabuksh pozish pazir.

---

cation, and the application of the feet in scansion or *takti* تقطيع (lit. cutting in pieces).

مصرع

دلا وصف ميانی نازك جانان من گفتی

Hemistich—Measure *Hazaj*, or *Mufailan Mufailan Mufailan Mufailan*
Dila wasf-i-miyani nazuk-i-janan, i man gufti.

Persian mode of scansion of the above.
Dila Wasfi—*Mufailan*—Miyani na—*Mufailan*
Zuk-i-janan—*Mufailan*—ni Man gufti—*Mufailan.*

مصرع

حسن ولطف ترابنده شد مهر و مه

Hemistich—Measure *Mútaddrik*, or *Failan, Failan, Failan, Failan.*
Husn o lutfi-tora bandah shud mihr o mah.

Scansion.
Husn-o-lut—*Failan*—fi-tora—*Failan*
Bandah shud—*Failan*—Mihr-o-mah—*Failan.*

Rules for the quantity of the syllables are laid down with great minuteness in the Persian and Arabic treatises. Sir W. Jones's Persian Grammar contains a short though lucid article on the subject, to which the reader is referred.

* Poetical compositions, by the early Persian writers, were classed under three heads, viz. the *Kasideh*—the *Masnavi* and the *Musammat*. In after times they have been divided into eight—viz. the *Fard*, the *Rubái*, the *Kita*, the *Masnavi*, the *Ghazal*, the *Kasideh*, the *Musammat* and the *Tarji.*

فرد

به پوش گر بخطای رسی وطعنه مزن
که هیچ نفس بشر خالی از خطا نه بود

Fard.

Ba posh gar ba khatái rasiwa tána mazan
Kih héch nafs bashar kháli az khata na búd.

The first word of the first line of a *beit* or distich is termed the *sadr* صدر, its concluding one the *arux* عروض. The first word of the second line is called the Matla مطلع and its last the Ajuz عاجز. The two last are by some styled the *Ibtida* ابتدا and the *Zarab* ضرب. The intervening words are called the Hasho حشو.

For instance, in the preceding *beit*, the word *Khudáwand* is the *Sadr—Dastagir*, the *Arux—Karim*, the *Matla*, and *Pazir*, the *Ajúz*. The words in the centre of the lines enclosed by these four, constitute the *Hasho*.

The *beit* has sometimes a double rhyme—in such cases the penultimate is termed *Kafiyeh* قافيه and the ultimate *Radif* رديف. In the subjoined distich *Hasti* and *Pasti* form the *Káfiyeh*, and the two *Toi* the *Radif*.

بيت

پناهی بلندي وپستي توي
همه نيستند آنچه هستي توي

Beit.

Panah i bulandi wa pasti Toi
Hamah nestand án chih hasti Toi.

The *Rubài* رباعي

or quatrain, consists of four *misras*, the two first of which rhyme with the fourth—for instance :

رباعی

ايدل طلب كمال در مدرسه چند
تكميل اصول وحكمت هندسه چند
هر فكركه جز فكر خدا وسوسه است
شرمي زخدا بداركين وسوسه چند

Rubài.

Ai dil talab kemál dar Madrasah chand
Takmil-i-asùl wa hikmat-i-hindasah chand
Har fikr kih juz fitr-i-khuda waswasah ast
Sharmi az khuda badár kih in waswasah chand.

Sahibi is celebrated for the beauty of his *Rubaiyàt*. A *Rubài* resembles in rhyme the four first *misras* of the *Ghazal*; and is generally written in the same measure, viz. the *Bahr-i-Hazaj*, or in one of its varieties. According to the *Dustùr-i-nazm*, a measure for the *Rubài* has lately arisen composed from the measures of the *Muzària* and *Mushakil*, and called the *Bahr-i-Ruba-yat*.

The *Kita* قطعه

Never comprises less than two couplets—in the *Kita* the two last lines of each distich are most frequently made to rhyme, though there is no fixed measure for this class of composition. The first *Kita* in the *Diwan* of *Hafiz* is written, like a *Masnavi*, in rhyming couplets.

قطعه

اي كريميكه ازخزانهٔ غيب
گبرو ترسا وظيفه خور داري
دوستانرا كجا كني محروم
توكه با دشمنان نظرداري

Kita.

Ai karími kih az khazanah-i-ghaib
Gabr wa tarsa wazífah-i-khud dári
Dostánra kúja kani mahrúm
To kih bá dúshmanán nazer dári.

The *Kitas* of *Sàdi* are in the highest esteem. This class of composition rarely exceeds twenty couplets.

The *Masnavi* مثنوي.

In the *Masnavi* both lines of the distichs rhyme together—for instance:

مثنوي

الهي غنچهٔ اميد بگشاي
گلي از روضهٔ جاويد بنماي
بخندان از لب آن غنچه باغم
وزين گل عطر پرورکن دماغم

Masnavi.

Illahi ghunchah-i-umaid bakùshài
Gùli az rouzat-i-jàwid banùmaí
Bakhandan az lab-i-àn ghunchah-i-bàgham
Waz-in gul attar parwarkan dimàgham.

Compositions written in this style never contain less than 12 couplets and are often of great length—romances, love-tales, histories and epic poems—the *Shah-nameh* of *Firdousi*, the *Makhzen al Asrar*, the *Shirin wa Khasro*, the *Secunder-nameh* of *Nizàmi* and numberless others are of this stamp, which may be truly called the heroic verse of Persia.

The term *Masnavi* is more strictly confined however to poems bearing this name—the productions of *Jámi*, and *Mouláno Rúm*—its rhymes are generally double. The measures in which it is most frequently written are seven in number—viz. 1st the *Bahr-i-Sari*—2d, the *Hazuj Ajzab Makbúz Makhzúf Musaddas*—3d the *Mukárib Maksúr Musamman*—4th the *Ramal Musaddas Maksur*—5th the *Khafif Maktúa*—6th the *Hazaj Makzúf Musaddas*—and 7th, the *Ramal Majnún Muktua Musaddas*.

It is also termed مزوج *Muzawwaj*, paired, from its rhyming couplets.

The Malays have a species of verse resembling the *Masnavi*, known under the generic term of *Sayer*, in which their romances and moral poems are written.

The *Ghazal* غزل.

Is a short ode, generally on the delights of wine, love or beauty, comprising from 5 to 18 distichs ; or, according to some writers, from 3 to 25. Under the outward symbols of sensual delights and terrestrial pleasures, are frequently concealed metaphysical meanings and allusions to divine love and spiritual beatification.

In *Ghazals* the two first lines must rhyme with the second line of each succeeding couplet—for instance in the following extract of an ode from *Akhsangi :*

غزل

اي شمع زرد روي كه با اشك ديده
سرخيل عاشقان مصيبت رسيده
فرها دوقت خويش و مي سوز وي گداز
تاخود چراز صحبت شيرين بريده
ياري به باد دا ده ارنه چرا چو من
بدرنگ واشك بار و نزار و خميده

Ghazal.

Ai shama zard rúi kihbà ashk dìdahi
Sar-khail-i-áshikán-i-masìbat rasìdahi
Farhád-i-wakt khèsh mèsóz wa mègudàz,
Ta khud chira az sohbat-i-Shìrìn baridàhi
Yàri ba bàd dàdahi ar nah chira chù man
Bad rang wa ashk bàr wa nizàr wa khamìdahi.

The first distich of a *Ghazal* or *Kasidah* is called the *Matla* مطلع or the *Mabda* مبدا. The second, the *zeb Matla* زيب مطلع or *Husn Matla,* حسن مطلع and the concluding distich the *Makta* مقطع or *Khatimah* خاتمه. The poetical title of the poet is often introduced in the *Makta*—as in the odes of *Hafiz.**

Ghazals are set to music and are composed in the measure *Hazaj* (No. 6).

The *Sáki nameh* ساقي نامه.

The *Sáki-namehs* of Hafiz, though rhyming like the *Masnavi,* rank next to the *Ghazal.* They comprize from eight to forty verses, in praise of wine and bacchanalian enjoyment, addressed to the cup-bearer *(Sáki).* Like the *Ghazal* they not unfrequently conceal a mystic meaning. The *Sáki nameh* may be styled the Persian dithyrambic.

The Kasidah قصيده

Is longer than the *Ghazal,* although rhyming generally in the same way. It comprises from 15 to an unlimited number of couplets, commonly ranging however between 70 and 170. The subject of the *Kasìdah* is of graver and more serious import than that of the *Ghazal,* though it sometimes condescends to embrace forms aerial and creations of the imagination in its numbers, at the expense of its name. For instance should it dwell upon the budding pleasures of spring—its refreshing verdure—or, butterfly-like, revel a moment in the full blown charms of the blushing rose, it loses the name of *Kasìdah,* and is called *Bahariyeh* (from Bahar بهار spring). Should it treat of love it becomes an *Ishkiyah,* and when of the poets own renown—a *Fakhriyah* (from *Ishk* عشق love and *Fukhr* فخر glory).

It sometimes happens that the name is given with reference to the letter in which the *Kasidah* terminates. For instance, should the last *misra* conclude with the letter م *Mim,* it becomes a *Mimiah*—if with ج *Jim,* a *Jimiah* and so on.

* This practice has obtained, according to the author of the *Zuwábit i azím,* from the time of *Sádi.*

Amrulkais, one of the seven early poets of Arabia, whose compositions were written on silk in letters of gold and suspended in the temple at Mecca, is the reputed inventor of the *Kasidah.*

Under the head of *Kasidah* may be classed the *Hajo* or satire—the *Madah* or encomium, and the *Wáz* or *Pandnámahs*—ethic poems.

The *Mustazad* مستزاد.

This is a stanza, each line of which has a shorter one appended. According to the author of the *Dastur-i-nazm* the *Mustazad* is written in the measure *Bahr-i-Rubayat*, and sometimes in that of the *Muzária.* The stanzas consist generally of four long and four short lines. The following example is from the *Zuwabit-i-Azim:*

مستزاد

ان بادشاه اعظم

یعنی خفیف ما

در بسته بود محکم

یعنی نه بود پیدا

ناگاه دلق آدم

یعنی لباس اسما

پوشید وبردر آمد

یعنی که شد هویدا

Mustazad.

An Badshah i ázam
    Yani khafif i ma
Dar bastah búd Mahkam
    Yani nah bud paida
Nagah dalk i Adam
    Yani libas i Asma
Poshid wa bar dar amad
    Yanikih shud huwaida.

The *Musammat* مسمط.

Moulána Wahid uddin Tabrízi defines the *Musammat* as comprising from four to ten *misras* or hemistichs, all rhyming together except the last. Should the *Musammat* consist of four *misras* it is hence styled a *Murabba*—if of five, a *Mukhammas*—of six a *Musaddas*—of seven, a *Músabba*—of eight, a *Músamman*—and if of ten, *Múasher.*

Of these the *Mukhammas* is most in vogue. The following is a specimen of the *Murabba* from *Sádi* :

مربع

من مانده ام رنجور ازو
درمانده ام مهجور ازو
گوي كه بيني دور ازو
در استخوانم ميخلد

Murabba.

Man mándah am ranjúr az ó
Dar-mándah am manjúr az o
Gói kih bíní dúr az o
Dar ústakhánam me khalad.

The subject of this class of composition is most commonly the pains of love—separation from its object—expostulation and entreaty. The five *misras* of the first *Mukhammas* in the *Diwan* of *Hafiz* rhyme all alike in *am*, in which also terminate the concluding *misras* of the succeeding nine. The following is a specimen :

مخمس

كو بخت كه از سر نيازي — در حضرت چون تو دل نوازي
معروض كنم نهفته رازي — هيهات كه چون تو شاهبازي
تشريف دهد در آشيانم

Mukhammas (Hafiz).

K'o bukht kih az sar nujazi — Dar hazrati chún to dil nuwázi
Máruz kunam nahaft rázi — Haihat kih chún to shahbázi
Tashrif dihad dar ashianam.

The *Musaddas*, the *Musamman* and the *Muasher*, terminate with a couplet rhyming differently from the preceding ones.

The *Marsujah* مرثيه

Is an elegy or dirge, consisting generally of upwards of 50 stanzas, arranged like the *Musamman*.

The *Tarikh* تاريخ

Is a stanza frequently used for inscriptions on edifices and tombs—from the numerical value of the last letters of the last *misra*, the date of the building is known. It is also used in historical and biographical treatises. The *Diwan* of *Hafiz*, contains a number of *Tárikhs* ; as also the *Tazkirat-i-Serkhúsh*. The numerical value of letters is ascertained from the *Abjad*.

The *Tarji band* ترجيع بند

Must not comprise less than five, or more than twelve, couplets. It derives its name from the recurrence of a line or distich at fixed intervals (Tarji ترجيع signifying receiving back).

The *Terji*, or *refrain*, at the end of each of the 7 *bands* or sets of verses in the Diwan of Hafiz, is as follows:

آن به که از صبر رخ نتابم
باشد که مراد دل بیابم

An bih kih az sabr rúkh-na tabam
Báshad kih murád i dil biyábam.

The *Terji-bands* of Hafiz rhyme like the *Ghazal*, with the exception of the concluding couplet or *terji* as above, which is a rhyming distich. They contain severally from 7 to 9 couplets.

The *Tarkib-bands* are more irregular in their rhymes, sometimes commencing like a *masnavi*, but generally like the *Ghazal*, and terminating in a rhyming couplet. Those in the *Diwan* of *Háfiz* turn chiefly on the praise of kings—kingly qualities, &c. The *Terjiband* has been selected as the vehicle for conveying lamentations on separation from friends.

The *Chistán* چیستان

Is an enigma in verse and prose.

The *Diwan* دیوان

Is a collection of *Ghazals*, corresponding in order and number with the letters of the alphabet, *Harúf-i-tahji*, in which their *radífs* rhyme in regular succession. The term diwan is not confined to an assemblage of odes, but is also applied to posthumous collections of an author's works either in prose or verse.

The *Khamsah* خمسه.

Khamsah in Arabic signifies five, and is a name given to collections of poems five in number—generally *Masnavis*. Among the most noted are the *Khamsahs* of *Nizámi*, *Jámi*, *Hatifi*, *Katibi* and *Amir Khusro*. That of *Nizami* (of which I possess a beautiful copy) comprises the *Makhnan al Asrar*, the *Khusro wa Shirin*, the *Haft Paikar*, the *Leila wa Majnun* and the *Secunder Nameh*.

The substance of these remarks has been almost entirely extracted from Persian treatises on prosody and versification, modified by the result of a careful examination of the compositions of some of their best poets. With the latter the numerous discordancies and perplexing opinions expressed in the former have been compared and considered, and the result alone, for the sake of brevity, communicated.

The treatises on prosody consulted were those contained in the *Zuwúbit-i-azim*, the *Chuhar Gulzar*, the *Mukhtaser al Fuaid* and the *Dastur i Nazm*.

A brief notice of some of the Persian Poets.—*By Lieut.* T. J. Newbold.

(*Continued from* No. 18, Vol. IV, P. 389).

Jami Moulana Nur-uddin.

جا مي مولا نانورالدين

A famous poet born at the town of *Jam*, near *Herat* in *Khorassan*, whence he derives his surname, about A. H. 817. His proper name is *Abdur Rahman Bin Ahmed*. The date of his demise is said to be A. H. 898. He repaired at an early age to the splendid court of *Sultan Abu Syed Merza*, a descendant of *Tamerlane*, who ruled in *Khorassan* until 873, A. H., when he was defeated and put to death by the Turcoman leader *Hassan Beg*. *Sultan Hussain*, who eventually succeeded *Abu Syed*, extended his protection to *Jámi*, and treated him with greater favour even than his former patron. The Sultan's vizier, *Mir Alli Shah*, entertained for *Jami* the greatest friendship and attachment. These circumstances, and the numerous lively anecdotes related of him by various Persian writers, stamp him to have been a man of ready wit, engaging disposition, and a keen observer of men.

A native of Ispahan, who was accustomed to boast of the productions of his own provinces, and to regard with contempt any thing foreign or extraneous, told *Jámi* one day that there were melons at Ispahan, of such an extraordinary size, that if a person sat on one he could not touch the ground with his feet, the poet retorted, "We have not in truth, at *Herat*, melons as large as those you have been at the trouble of describing, but we have turnips several cubits in length."

Another of *Samarcand* was one day extolling a species of grape peculiar to his country, called *Resh-i-Bâba*, the beard of one's father. *Jami* asked him whether that grape was more delicious than a sort growing in *Khorassan* called the *Khayeh-i-Ghulaman*. The man of *Samarcand* answered in the negative; when *Jami* observed, "in that case you must admit that the *Khayeh-i-Ghulâman* of *Khorassan* are of more value than the beards of your fathers, *Resh-i-Bâba*.*

One day a poetical aspirant read to *Jámi* a wretched poem of his own composition; of which, he boasted, not a single word contained the letter *Alif*. *Jami* dryly remarked that he had better have left out all the letters of the alphabet.

It is said that, on one occasion when *Jâmi* had set out for the purpose of paying a visit to his patron *Sultan Abu Syed*, on his way to the palace he heard that the monarch was immersed in the pleasures of the

* This pleasantry ill bears translation: the pith of *Jami's* jest will be sufficiently obvious to the Persian scholar.

banquet: on this he retraced his steps. When the *Sultan* was apprised of the circumstance, he despatched some of his attendants to recall him. On this, *Jámi* composed a *Ghazel*, *extempore*, and sent it to the Sultan, in which *Jámi* excuses his *mal-a-propos* intrusion. The two following couplets are extracted from the ode in question:

رباعي

نه زهد آمد مرا مانع نه بزم عشرت ایشان
غم خود دور میدارم زبزم عشرت اندیشان
بجای کاطلس شاهان نشاید فرش کرد حاشا
که راه قرب یابد دلق گرد آلود درویشان

Rubai.

Neither abstinence, nor the banquet of the votaries of pleasure, are obstacles to me.

I keep my sorrows apart from the feasts of the gay.

It would be improper to spread my humble carpet on the place where shine the satins of princes.

The dust-soiled garment of the dervise finds a nearer way to God.

The compositions of *Jámi* are extremely numerous. The *Anthologia Persica*, printed at Vienna, in 1778, contains a list of upwards of forty. *Mahomed Bukhtawer Khan*, one of his biographers, declares them to be innumerable.

Jami's principal works are:—

سلسلة الذهب

The *Silsileh uzzahib*—a poem in three books.

قصه سلامان والسال

The *Suliman-wa-Assal.*

رقعات جامی

The *Kukaat-i-Jámi*—a collection of epistles.

سبحة الابرار

The *Subhet-al-Abrar.*

سکندرنامه

The *Secunder námeh*—an epic on the exploits of Alexander the Great.

دیوان جامی

The *Diwan-i-Jámi*—an elaborate collection of poems, containing many of the mysticisms of Mahomedan theology.

بهارستان

The *Baharistan*—a descriptive poem dedicated to *Sultan Hussain Baicarra.*

ليلي و مجنون

The *Laila wa mejnun.*

يوسف و زليخا

The *Yusuf wa Zuleikha*—two celebrated love tales.

تحفة الاحرار

The *Tohfet al-ahrar.*

Besides these are many dissertations in prose on theological subjects. He dedicated a work on ethics, called the *Irshad*, to *Mahomed Khan*, second *Sultan* of the Ottomans. His seven principal works form a collection styled the *Heft Aurung*, the seven thrones.*

In the epistles of *Jámi* is introduced so much pure Arabic that, to the mere Persian reader, they are in many places utterly unintelligible. Mr. Lumsden in his elaborate grammar of the Persian Language, has adduced a remarkable example of the unlimited intermixture of the two tongues (Vol. I. P. 398), and has strongly recommended, what I believe most orientalists concur in, that the study of both languages should go on together. The introduction of Arabic to this extent is of modern origin, subsequent of course to the conquest of Persia by the Arabs. *Sadi*, whose study of Arabic in the college at Bagdad, was not confined, has done a great deal to render that tongue fashionable among Persian poets.

The *Bagh-i-Iram* and *Silsilah uzzaheb* of Jami are both written in the measure *Khafif Muktùa*. The *Leila wa Majnun* in the *Hazaj Ajzab Makbuz Makhzuf Musaddas*; and his *Yusuf Zuleikha* in the measure *Hazaj Makhzuf Musaddas.*

Ibn khatib,

ابن خطيب

Surnamed *Kaikhusro*, or *Taj uddin Ahmed*, flourished in the time of *Sultan Mahmúd Ghaznavi*, in the 4th century of the Hejira.

Jelal uddin Atiki,

جلال الدين عتيقي

Was living at the time the *Tarikh i Guzideh* was written, by the author of which work, *Bin Aber Bekr-Bin Ahmed-Bin Nasir Al Mastoufi-*

* M. Antoine Galand, in his "Paroles Remarquables," speaking of Jami, remarks "Il a composé un grand nombre d'ouvrages, tant en vers qu'en prose, et l'on compte cinq Divans parmi ses Poesies, c'est a dire, cinq recueils complets de Gazels par ordre Alphabetique."

Al Cazvini, he is mentioned. The *Tarikh i Guzideh* was completed in 730 A. H. *Atiki* is noted for the beauty of his *Ghazels.*

غزل

از خاک کف پایت هر گرد که بر خیزد
جانهاش فرو بارد دلهاش فرو ریزد
آن برق که سوزد عقل از ابر غمت تابد
آن بوی که جان بخشد از خاک درت خیزد
سودای توام در خاک سرمست بخوا باند
بوی تو ز خاکم باز دیوانه بر انگیزد
از تو نبرم صد ره چون عود گرم سوزی
دود دلم آید باز در دامنت آویزد
ای جان عتیقی کی با عشق بر آید دل
با شاه گدا یارا هر گز که بستیزد

Ghazal.

From the sole of thy foot every particle of dust which arises,
Scatters the lives (of the beholders) and strews around their hearts.
The lightening that scorcheth up wisdom, flashes from the cloud of
thy grief.
Odours imparting life, perfume the air from the dust of thy threshold.
It is the love of thee, that causeth me to slumber intoxicated in the dust;
And thy perfume that again arouseth me thence to madness.
Though thou wert to consume me with fire, I should not fly a hundred
different ways like wood of aloes ;
But the smoke of my heart (my sighs) would come and cling to the
skirt of thy robe.
O my life! when can the heart of *Atiki* separate itself from love of thee?
O my friend! how can a beggar contend with a king?

Jelal Beg,

جلال بیگ

Surnamed *Bakái,* was a poet of some merit, who lived in the time of the emperor *Akber,* by whose order he was put to death for having poisoned his father. He was a native of *Cashmir.*

Jelál uddin Cáshi,

جلال الدین کاشي

Or *Syed Jelal Uddin,* cotemporary with *Abaka Khan,* flourished

in the 7th century of the Hejira. His *forte* was satire. In answer to some reproaches cast upon him by *Sádi*, he wrote a *Terji*,* of which the first couplet is given by *Al Cazvini*: it runs as follows, and has a mystic meaning:

بيت

منم مست و رند لاابالي

واين شيوه مراهست لايزالي

Beit.

I am a drunkard and a debauchee I allow; but what matters it? Such is my habit and constant practice.

Jelal Diwáni,

جلال ديواني

Styled the second Aristotle. Notwithstanding *Diwáni's* skill in rhetoric and his enlightened expositions of abstruse subjects, his Persian historian declares him to have been mad; *i. e.* a poet. His works abound with metaphysical subtleties. He died A. H. 908 aged 70.

Jelal uddin Méilla i Rúm,

جلال الدين ملا روم

Author of the celebrated *Masnavi* bearing his name, and which comprises upwards of 30,000 couplets, was born at *Balkh* towards the commencement of the 7th century of the Hejira: he died A. H. 672, on the fifth day of the month *Jemàdi al Akhir*, at sunset. He is called by some, *Bin Mahomed al Balkki ar Rúmi*. *Jámi* relates that from his fifth year this high priest of the *Súfis* was accustomed to discern spiritual apparitions; and forms from the other world, of beings usually veiled from human gaze—the recording angel—good genii—and the select spirits of mankind who are concealed under domes of glory—all became visible and assumed a definite shape.

The *Mouláns*, as he is often styled, like a pious Mussulman performed the *Haj* or pilgrimage to Mecca. On his travels he fell into the society of *Shaikh Ferid uddin Attar* at *Nishapore*, who gave him his *Asrar-Nameh*, or book of secrets: this the *Mouláns* always kept by him.

Seraj uddin Kounawi was one of the most learned men of the time, but as his ideas and those of our poet on theological subjects did not agree, sought every opportunity of mortifying him. Some persons reported to him that the *Mouláns* had been heard to say that he agreed with all the opinions entertained by the seventy-three sects into which

* A *Terji* is a kind of stanza, in which one line recurs at fixed intervals.

the followers of Islam are subdivided. On this *Kounawi* sent one of his friends, a person of great acquirements, to the *Moulána*, in the midst of a large assembly, to ask whether this were true; and, if so, to disgrace him publicly. He went, and on the *Moulána's* acknowledging it, commenced a violent harangue filled with abuse and invective. The *Moulána* patiently allowed him to go on until he was fatigued. When he had concluded, he smiled and calmly observed—" In all that thou hast just been saying I also agree." His reviler abashed and confused, retired.

The following anecdote, from a number of others of the same stamp, may suffice to shew the manner in which these dreaming visionaries are accustomed to apply the external impressions of this sublunary world to the subjects of their own abstruse meditations. One day the *Moulána*, seated among his pupils, observed, on hearing the sound of a *Rebab*, " the sound of that instrument is the melody of the gate of Paradise." A bystander of little faith, remarked, " I too hear the very same sound, but do not experience these glowing sensations." The *Moulána*, in allusion to the scepticism of his adversary, exclaimed, " God forbid that you should! What *we* hear is the melody of the portals of Paradise *opening* for us: what *you* hear is the grating of them *closing* upon you." In his last illness *Jelal-uddin* thus addressed his intimates—" Be not sorrowful in that I am now about to depart from among you: inasmuch as *Nur Mansur* (the mercy of God on him), a hundred and fifty years after the termination of his mortal career, became visible to *Shaikh Ferid uddin Attar*; and remained with him continually as his spiritual guide. Under every circumstance be ye with me, and keep me in remembrance, in order that I may extend your welfare in every state of existence (lit. in every dress) in which my destiny may place me. There are now only two links that bind me to this world: the first, obedience to the will of God—the second, yourselves. When, through Almighty grace, I become a simple elementary being, and the world of indivisibility shall have opened on my view, the tie which attaches me to you will still remain."

When *Shaik Sadi Uddin* (may God purify his inward state) came to see the dying poet, he ejaculated, " May Allah grant you a speedy recovery and advance your dignity." *Jelal uddin* replied, " May God also effect your cure. Between the lover and his mistress there now remains nought but a thin garment. Would ye not that light unite with light?"

بيت

من شدم عريان زتن وازخيال
ميخرام در نهايات الوصال

Beit.

I am emancipated from the body and from vain ideality—and walk erect in the reality (of the joys) of union. On hearing this the *Shaikh* and his friends began to weep. The *Moulàna* consoled them and said,

مصرع

چه داني توكه در باطن يارے همنشين دارم

Misra.

Do you not know that I possess inwardly a constant friend?

His last injunctions to his disciples and friends are as follow: "These are my last precepts to you—Be ye pure before God both in private and in public—eat sparingly—sleep sparingly—and speak sparingly. Flee from wickedness and crime—be constant in fasting, and assiduous in uprightness. Abandon fleshly lusts, and endure with patience the tyranny of men. Shun the society of the ignorant, and cultivate that of the virtuous and meek; for assuredly the best of mankind is he that benefits his fellow creatures, and the best of language is prayer and praise to God.

On his disciples desiring him to appoint a successor, he said, "Appoint Chelbi Hussain Uddin." He repeated this three times. On their asking him his wishes with regard to *Sultan Walid*, he answered, "Walid is a warrior and needeth not advice." Chelbi then asked who should perform his burial service—he answered, "*Sadr-uddin*." His last words were these—"My friends draw me one way and *Shems-uddin* another. Listen, O my tribe to him that calls upon the Almighty. I now am compelled to quit you." The poet then placidly yielded up his spirit into the hands of Him that gave it, just as the sun went down. The beauty and pathos of his dying injunctions, and the Socratic composure of his last moments, will scarce be excelled by aught that modern or ancient history can offer.

The following are the opening lines of his celebrated *Masnavi*, elegantly paraphrased by Sir William Jones:

مثنوي

بشنو ازني چون حكايت ميكند

وز جدايها شكايت ميكند

كز نيستان تا مرا ببريده اند

از نفيرم مرد وزن ناليده اند

سینه خواهم شرحه شرحه ازفراق
تابگویم شرح درداشتیاق
هرکس کود ورماند ازاصل خویش
باز جویدر وزگار وصل خویش

" Hear how yon reed, in sadly-pleasing tales,
Departed bliss and present wo bewails!
With me from native banks untimely torn,
Love-warbling youths and soft eyed virgins mourn.

O! let the heart, by fatal absence rent,
Feel what I sing, and bleed when I lament:
Who roams in exile from his parent bow'r,
Pants to return, and chides each ling'ring hour."

The *Masnavi* is written in the measure, *Ramal Musaddas Maksúr.*

Jelal uddin Rouzet-i-Bahar,

جلال الدین روضة بهار

Flourished during the reign of *Yacúb,* king of Persia. He is author of a poem, entitled the *Temárat al Ashgiah.*

Jehangir Padshah.

جهانگیر پادشاه

This monarch is included by the author of the *Tazkiret-i-Serkhúsh* in his catalogue of poets, and no doubt possessed considerable talent for poetry, as numerous couplets and stanzas, quoted as his extempore effusions, attest; though it does not appear that the royal amateur ever achieved any thing like a regular poem.

The memoirs of his life penned by himself are well written and evince much observation and ability. *Jehangir* ruled in Hindustan from A. H. 1014 to 1037, when he died, according to Dow, on his way to *Cashmir* in the 58th year of his age.

Tavernier speaks very highly of his "illustrious queen," the *Bégum Núr Máhal,* and gives an engraving of the pieces of money coined by her command, during the twenty-four hours of imperial sway granted her by the emperor. She could read, write, and compose in Arabic, Persian and Hindi. One day seeing the emperor in a vest fastened by a ruby of uncommon lustre, she improvised this couplet:

بيت

ترانه تکمۀ است برلباس حریر

شده است قطرۀ خون منت گریبان گیر

Beit.

That is not a ruby that sparkles on thy silken vest;
But a drop of my blood that clings there.

Núr-Mahal was the daughter of a poor Tartar chief named *Khajeh Aiass.* She was eminently beautiful and accomplished, and possessed great influence over *Jehangir's* councils. After her marriage her original name *Mihr-unnissa,* or the sun of women, was changed for the appellation—*Núr-Mahal,* light of the Haram—which was subsequently laid aside for the more imposing title of *Núr-Jehán,* light of the world.

Jemaluddin Abdal Rizak,

جمال الدین عبد الرزاق

Cotemporary with *Khacáni* and *Assir Uddin*; and father of the celebrated poet *Kemal uddin Ismail.*

Jemal uddin Astozi,

جمال الدین استیزي

Of Tabriz, where he died--his remains were interred at the *Mukbarat-us-Shóra.* He was accounted a good poet.

Jemal uddin-Ben-Ishak,

جمال الدین بن اسحاق

Author of a poem entitled, *Ganj. al Ishtiha,* the treasure of desire.

Jemal Dehlawi,

جمال دهلوي

Was one of the courtiers of *Sultan Secunder Bin Behlol.* After this monarch's death, he turned traveller and visited many regions, performed the pilgrimage to Mecca, and stayed some time at Herat with

Moulavi Jámi, "by whose spiritual advice he profited much." Subsequently he visited Hindustan, and entered into the service of the emperor *Humaiyún.* The *Sair al Arifein* was compiled by him. He was called the *Khusro* of Hindustan.

Jemal Resek al Ghaten,

جمال راسخ الغطن

Al Ghaten is a quarter of the city of *Cazivin,* in the dialect of which, this poet's works are composed. He died in the reign of *Abaka Khan,* at the advanced age of ninety. No mention is made of his works.

Imámi,

اما مي

A native of *Herat,* his proper name is *Abdullah Mahomed Ben Aber Bekr Asman*—he sung the praises of the sultans and viziers of *Kirman.* He died during the reign of *Abaka Khan.*

Jaffer or *Asef Khan,*

جعفر

He flourished during the reign of the emperor *Akber,* to whose court he repaired from his birth place *Cazivin.* His works are a *Másnavi,* entitled *Khusro-i-Shirin,* and a *Diwan.* There is another poet of this name, who flourished in the time of *Alumgir,* and composed a *Diwan.*

Judai.

جدائي

This is the surname of *Mir Syed Ali,* who was "one of the wonders of the age" during the reign of the emperor *Akber.* He completed the historical romance of *Amir Hamzeh* in sixteen volumes; every volume of which, according to his biographer *Mahomed Bukhtawer Khan,* is as large as a chest—every leaf, a cubit in length, and every page adorned with a likeness of the *Amir.*

XII.—*An Essay on the Relationship of Languages and Nations.—By the Reverend* Bernhard Schmid.

The idea of ascertaining the relationship of nations by comparing their languages, is peculiar to the learned of modern Europe; and, if carried on in a philosophical spirit, and according to sober and well substantiated rules of etymology, it cannot but afford most important clues, and lead us to very unexpected historical and antiquarian discoveries. Such a study of languages may well be compared to the equally modern branch of human inquisitiveness, the study of fossil remains of a former world, of which the examination of the *Sivatherium*, in the 12th number of the *Madras Journal of Literature and Science*, contains so instructive and interesting a specimen.

The design of the present paper is merely to suggest some authenticated hints, in what quarter and by what methods philologico-historical discoveries may be made; in hopes that those who have more leisure and literary means, will pursue these inquiries, and communicate their remarks to the literary public.

1.—Those who have directed their attention to the study of a comparison of languages are agreed, that a conformity of the *grammatical* part (the inflexions of the conjugations and declensions), is one of the most infallible proofs of the near relationship of languages. If this is correct, the *Armenian* language will be found to occupy a most important place in our inquiries; as will be apparent from the following statements:

Armenian Auxiliary Verb.		*First Conjugation.*		*Terminations of the 4 Conj. in Armenian.*	
em,	I am	es sirem,	I love	em,	active
es,	thou art	tu sires,	thou lovest	am,	neuter
é,	he is	na siré,	he loves	um,	reciprocal
emk,	we are	mek siremk,	we love	im,	passive
ek,	you are	tuk sirek,	you love		
en,	they are	noka siren,	they love		

Before I proceed, I would just observe that the Armenian auxiliary, although preserved only in fragments in other languages, seems to have been the basis of all the Indo-European conjugations; the terminations of the Armenian conjugations, or rather modifications of the verb, are remarkably simple, regular, consistent, and evidently formed by the same people who formed the other inflexions, without interference and immixture of other languages.

2.—But there are also various *words* which throw an important light on the question, and prove that the Armenian is a very interesting middle-link between several Indo-European languages; e.g. mietz

(great) preserved in Greek, in the form of *μειζων*, and in Latin, in the superlative *maximus*;—aïl = *αλλος*, *alius*;—akaraḫ* (a ploughed field), in German *acker*, *αγρος*, *ager*;—kuḫ (a cow), in German kuh, and (what is remarkable) the plural of it, in the Thüringian, and high (or mountainous) Saxon provincial dialect, is Küḫe* (in Sanscrit, Tamul and Persian, *ko*); *ór*, pronounced *wur*, (fire), *uro*, *comburo*, (the Armenian pronunciation of *or*, viz. *wur* or *vur*, explains how the letter *b* could come into the Latin compound); from *vur* comes the Dutch *vuur*, the uu, or long u being sounded in Dutch as the French ü, the similarity with *πῦρ* in Greek, is the more striking; *feuer* in German is merely another modification of the same sound; hence, the English *burn*, = *brennen* in German. Not to mention, that the Armenian *or* and *ur* will strike every one as being identic with the Hebrew אוּר (*ur*, *fire*) and אוֹר (*ór*, light)—astḫ (a star)= *αστηρ*, aster;—*mi* in Armenian means 1st, one = *μια* ; 2d, lest, = *μη*;—gin = *γυνη*;—nyu a woman, always in the signification of *nubere*, or *nupta*; (the derivation of *nubere* from *nubes* always appeared to me far-fetched and unnatural). Also in Chinese, I am told, the same root means *a woman*. *Sinear (Shinar)*=an assemblage of men; *kar* (a stone) *χερμαδιον*; *mart*, means 1. a man (= *mas*, *maris*); 2. *a* battle, 3. the god *Mars*, (*Martis*).

3. *Comparison of Conjugations.*

Armenian.	*Hungarian.*	*Bohemian.*	*Latin.*	*Greek.*	*Brettany.*
Luanam	irok, irom	wolam	do	τιμαω	kanann
luanas	irsz, irod	wolash	das	τιμας	kanez
luanaë	ir, irya	wola	dat	τιμα	kan
luanamk	irunk, iryunk	wolame	damus	τιμαομες	kanomp
luanak	irtok, iryatok	wolate	datis	τιμᾶτε	kanit
luanan	irnak, iryak	wolagi } wolau }	dant	τιμαοντι	kanont
λυω lavo	I write, I write it	I call	......	......	cano

* It is undeniable that the Greek termination of *os* corresponds to the Sanscrit *oh*, and also that the sound of the Greek χ and of the Scotch *ch* is often originated from the single aspirate sound of h, or substituted for it; hence the propriety of using the *h* with some diacritical mark, to express the Greek χ or Scotch ch, seems to be evident.— In cases like the present, where it is important to inform the reader of the exact pronunciation of foreign words, it is evident that diacritical marks are necessary, as *h* with two or three dots underneath, is doubtless the most suitable, to intimate the near relationship of the sounds of *h* and χ or the Scotch *ch*.

Remark 1.—The general agreement of the Armenian with the Hungarian conjugation, especially in the plural, is surprising. It evidently shows that the Hungarians must have come from the Himalayan range, and it must powerfully draw the attention of the public to the Tibetan researches of Körös, the learned Hungarian.

Remark 2.—The Bohemian appears to be an equally remarkable middle-link between the Armenian and the Sanscrit tribe (Greek and Latin). To save room, I have omitted in this synopsis the Sanscrit; the similarity of which with the Greek and Latin is well known, as *dodami, dodasi, dodati, with διδωμι, διδως, διδωσι,* and with *do, das, dat*; especially if we remember the subjunctive, *dem* or *legam*, where the original letter of the first person, *m*, re-appears. (It scarcely needs mentioning, that I have purposely put τιμαομες or τιμωμες and τιμαοντι according to the Doric dialect, instead of τιμωμεν, &c., in order to make the uniformity more evident).

Remark 3.—The agreement of the conjugation of the language of Basse-Bretagne may be owing to Latin immixture, unless other facts prove this language to be an *independent* Celtic dialect.

Remark 4.—The other tenses of the *Armenian conjugation*, having the letter *z* as a distinctive mark of the first past tense, and of the future, agree with the Greek in a remarkable manner. I add also the perfect tense of the dialect of Basse-Bretagne, as being analogous.

4. *Armenian Conjugation of the other Tenses:*

1 Past.	Sirezi, sirezir, sireaz, sirezak, sirezik, sirezin.
2 Past.	Sirealem, sireales, sirealê, sirealemk, sirealek, sirealen.
Plup.	Sirealêi, sirealêir, sirealêr, sirealéak, sirealéik, sirealéin.
Fut.	Sireziz, sireszis, sireszê, sireszuk, siresjik, sireszen.

Conjugation of Brettany.

Perfect.	Kaniz, kanzoud, kanaz, kanzomp, kanzot, kanzont.

Remarks.—In the Bohemian language, as well as in the Armenian, the participle of the past tense terminates in *l*: e. g. *wolal gsem*, I have called (strictly, I called having am). Every where a remarkable analogy! Neither can I omit mentioning, that the letter *r* of the 2d person of 1st past tense, and the 2d and 3d persons of pluperfect, sirezir, sirealêir, and sirealêr, reminds one of the Latin subjunctive, as: *audirem, docerem, docuerim*; as also the third person plural, sirezin, sirealin, of docuerint, riserint. I cannot believe that this is mere accident; but whether a tribe, nearly related to the Armenians, *imported* into Italy these fragments of their conjugation, or whether the Romans, being a branch of the great Caucasian, or rather Himalayan race, after having settled in Italy, through congeniality of mind and language, *formed* their conjugation so analogously, I am not prepared to say.

5.—Also the Bohemian, Greek and Latin *declensions* are very analogous to the Armenian; e. g.

	Armenian.	*Bohemian.*	*Armenian.*	*Latin.*	*Greek.*	*Bohemian.*
Sing.	(Thing)	(door)	(Seed)	......	....	(a young cat)
N.	Pan	brána	sermn	semen	σπερμα	kotyé
G.	pani	brány	serman	seminis	σπερματος	kotyete
D.	'ipan	branyé	'isermn	semini	σπερματι	kotyeti
Acc.	z pan	branu	z sermn	semen	σπερμα	kotyé
Abl.	'ipaniv	......	'isermene	semine	....	....
Local.	'ipani	u brányé	'iserman	......	....	u kotyeti
Circum-ferential	z pani	......	z serman	......	....	....
Instr.	'ipani	s bránau	'iserman	......	....	s kotyatem
Plural.						
N.	Pank	brány	sermank	semina	σπερματα	kotyata
G.	panitz	bran	sermanz	seminum	σπερματων	kotyat
D.	'ipans	bránám	'isermans	seminibus	σπερμασι	kotyataum
Acc.	z pans	brany	z sermans	semina	σπερματα	kotyata
Abl.	'ipanivk	......	'isermanpk	seminibus	....	....
Loc.	'ipanitz	u branah	'isermantz	......	....	u kotiateh
Circ—	z panitz	......	z sermantz	......	....	....
Instr.	'ipans	s branami	'isermans	......	....	s kotiatami / s kotiaty

It seems scarcely credible that nations, so remote from each other, and living in so very different climates and countries, should have preserved so great an analogy in their dialects. Even if the similarity of some inflexions of the Armenian and Latin verbs were granted to be merely accidental, it is impossible to fancy that these declensions, also, are thus similar to each other by mere accident. The nations who speak, or spoke, these languages *must be branches of one and the same tribe.*

The *v* in the Armenian ablative, changed into *p* in the plural, by its position between two other consonants (in *'isermanpk*) shows clearly that the ancient Greek φι (in στρατοφι, κεφαληφι, στηθεσφι), and the Latin *bus* (also in *deabus*), are identical inflexions, as well as of quite similar form in Sanscrit; and grammarians need tell us no longer, with their wonted gravity and confidence, that φι is a "particula enclitica," unless they are prepared to maintain, that *bus* in Latin, and *v* and *pk*, are also enclitical!

6.—The *Numerals* are likewise an important means of ascertaining the relationship of nations, although not equally infallible; since one tribe may be induced to adopt them from a quite foreign nation; as is the case with the Tamulians, who have borrowed the Sanscrit numerals, although they use *commonly* their own original ones, and thus cases may likewise occur, of tribes losing their own numerals entirely and exchanging them for those of foreigners.

As a comparison of the numerals, however, may be useful to suggest various other instructive philological observations, a list of them follows here, adding the personal pronouns in opposite columns, for reasons which will appear immediately.

The numeral *One*	—the pronoun *I.*
Ici, Japanese	ya — Russian, Polish, Wendish.
ye, Chinese	
djigh, Thibetan	
yak, Persian	
yek, Gipsy	ick, low Germ.
hek, Multan	εγω
ök, Bengal	ego
egam or eḥam — Sans. according to Tamil orthog.	aham Sans.
	ich German, pron. iḫ
	anoḫi, Hebrew.
	ga or ya, Bohem.
eka, Sanscrit	
egy, Hungarian	
äḥad Hebrew	
ahad, Arab.	
geden or yeden — Boh.	
unus, Latin	on (I) om (we) — Abor. of Neilg.
one, English,	
in, ihn, Welsh	
ein, eins, Germ.	ana — Arabic, Abyss.
	en, Hungarian.
ἑις, ἑν	es, Armenian.
μια,	ma, (we) Pehl.
	mi, (we) Hung.
	mi, Armenian.
	my, (we) Bohem.
	mö, amö, Gipsy.
oru, ondru — Tamul.	ammi, Hindost.
vonnu, onnu, — Karn.	ἀμμες, Doric.
	ἡμεις,

Numeral *Two*	—pronoun *Thou.*
Ul, China	ni, Tamul.
ni, Japon	tu, — Pehl., Mul. Bengal, Gip. Arm., Latin.
gniy, Thibet	
do, Persian	
dua, Afghan	
dui, Gipsy	tui, Russian.
dwa, Sanscrit	ty, — Pol., Wend. Bohemian.
tuvi, — Sanscrit in Tamul orthogr.	τυ, Doric.
δυω,	du, German.
duo,	zween, zwo, zwei, — Germ.
twitioh, Sanscr.	
zweite, German	
δευτερος,	bai, bos, ba (both), — Gothic.
dwa or dva, Boh.	
twaer, two, Icel.	baioth, Gothic.
du, bagh, Pehlvi.	αμφοτεροι,
besh, Zend,	ambo.
bis, Latin	
dowa, Malay	
loua, Cocoa-Islands.	
rua, Taheiti	
shnaim, Hebrew	anta, Arab, Abyss.
isnan Arabic,	enti, Maltese,
tnein, Malta	atta, Hebrew.
kettö, Hungar.	
ergov, Armenian.	
irendu, iru, Tam.	
iradu, Karnataka.	

Remarks 1.—I do not think, that the Chinese numeral, *ye*, and the Slavonian pronoun *ya*;—that the Arabic, *ana*, or the Hungarian pronoun

en, and the numerals *ein* or *ἓν*;—that the Tamul pronoun *ni*, and the Japanese numeral *ni*, have any connexion together. Many similarities in this list may be accidental, but *the general analogy of the numeral and the pronoun is very curious*. Should we not nearly be led to form the hypothesis, that the two or three most ancient languages had had each only one identical word for the numeral *one*, and for the pronoun, *I*, —and another word for the numeral *two*, and for the pronoun *thou*—but that in a subsequent revolution these words were confounded, just as the fossil bones and shells of widely different creatures, have been thrown together confusedly at Montmartre? The Sanscrit *egam* or *eḩam*, a numeral, has in Greek, Latin and German been employed not as a numeral, but only as a pronoun. The same is the case with the Greek *εἱς* and *ἓν* and the Hungarian and Bohemian *en* and *es*; *an* is the root of unus, *εἱς*, ein and one; but it looks as if indeed the Arabians and Abyssinians had employed it for *their* pronoun, and as if the Hebrews had joined it to the root of their own numeral äḩad, and formed anoḩi.

2. If it is true that human language is a faithful mirror of the human mind, and that scholars well acquainted with different nations, can trace the characters of a nation in their language, and draw often striking parallels between the idiom of a language and the peculiarities of the nation, it must be acknowledged also, that the above list exhibits an intuitive exemplification of the humiliating truth that man, in all ages and climes, considers his dear self, (his *ego*) as *Number one* (or egam), and the neighbour with whom he has to deal (*tu*) as *Number two*? Even the best of men, the most noble-minded and most generous, will catch his heart frequently at the attempt (although a hidden and refined and disguised one), to exalt *ego* over *tu*, and to transgress the great law of Him, greater than Solomon, who said, "love thy neighbour as thyself;" "do to others as thou wouldst be done by;" or "look not every man on his own things, but every man also on the things of others."

3. Gellius has a pretty remark on the pronoun (L. X. Ch. 3): "Nomina verbaque non positu fortuito, sed quadam vi et ratione naturæ facta esse P. Nigidius in grammaticis commentariis docet, rem sane in philosophiæ dissertationibus celebrem. Quæri enim solitum apud philosophos, *φυσει τα ονοματα ἢ θεσει*. In eam rem multa argumenta dicit, cur videri possint verba naturalia magis quam arbitraria; ex quibus hoc visum est lepidum et festivum: VOS, inquit quum dicimus, motu quodam oris conveniente cum istius verbi, demonstratione utimur et labias sensim primores emovemus ac spiritum atque animam porro versum et ad eos quibuscum sermocinamur intendimus. At contra quum dicimus: NOS, neque profuso intentoque flatu vocis, neque projectis labiis pronunciamus, sed et spiritum et labias, quasi intra nosmetipsos coercemus. Hoc idem fit et in eo, quod dicimus Tu, et Ego, et Tibi, et Mihi. Nam

sicuti quum adnuimus et abnuimus, motus quidem ille vel capitis vel oculorum a natura rei quam significat non abhorret: ita in his vocibus quasi gestus quidam oris et spiritus naturalis est. Eadem ratio est in Græcis quoque vocibus, quam esse in nostris animadvertimus." If these observations are correct (of which I have no doubt), the pronouns have been formed first, and then made use of (mostly with a modification of the sound and of letters) as numerals likewise.

4. It is evident that the word, *doubt*, comes from the word *two*; for just as the Tamulians changed the Sanscrit *dwa* into *tuvi*, the Latins changed *duo* into *dubito*, i. e. to be or to hesitate between *two* things; and, according to the same analogy, the Germans have derived from *zwei*, the word, *zweifeln* i. e. *dubitare*, *to doubt*. The word *between* comes from the same root (zwei or dwa), pronounced in Nether Saxony, tween or twén.

7. *Numeral*, 3.

San, Jap. China.
sùm, Thibet
se, si, Zend, Pers.
tri } Sanscrit
tiri } in Tamul orth.
trin, Gipsy
trai, Multan
tri, treḥ, Bohem.
τρεις, *τρια*
tres, tria
drei, German
three,
dri, Welsh
{ tritioh, Sanscrit
{ dritte, German
{ *τριτος*,
{ tertius,
{ third,
shelosh } Hebrew
shloshah }
selaset, Arabic
tlieta, Maltese
tola, N. Guiana
tolu, Solomon & Cocoa-Isl.
toru, Taheiti
harom, Hung.
erek, Arm.
múndru, Tamul
mùru, Karnataka

Numeral, 4.

Xi, su, Jap. China
ji, Thibet
čatverè, } Zend
četro, }
chatur, Sanscrit
sadur, Sanscrit Tamul orth.
čahâr, Pehlv. Pers.
čâr, Multan, Beng.
shtar, Gipsy
styri, Wendish
čtery*, Polonian.
čtyrči, Bohem.
shors, Armen.
dört, Turk.
τεσσαρες
τεττορες } Doric
πιτορες }
πισυρες } ancient Greek and Aeolic.
pedwar or peduor } Welsh,
fiorer, Icelandic
four,
vier, German.
negy, Hung.
arba, Hebrew
nânku, } Tamul
nâlu, }
nâlku, Karnataka

Numeral, 5.

U, China
go, Japan
nga, Thibet
panj, Persian, Gipsy.
panjam Sans. in Tamul.
besh, Turkish
pet, Bohem.
πεντε
pump, pimp, Welsh
fünf, German
fimm, Icelandic
five,
hing, Armenian
quinque
öt, Hungarian
ḥamash, Hebrew
ḥamsa { Arabic and Maltese
summus, Berbers in Africa
rima, { Moses Isl. Tahiti
lima, Solomon and Cocoa-Isl.
{ eindu, Tamul.
{ anju, vulgar Tamul.
eidu, Karnataka.

* In the Bohemian, and other Slavonic dialects, the English sound of *ch* and *tch* is expressed by a *c* with a diacritical mark, and in the Italian, by a simple *c*; the *c* with a circumflex appears the most suitable letter to express the sound, and to avoid ambiguity in a treatise on foreign languages.

Remarks referring to the *numeral* 3.—Also this numeral has in a few of these languages some similarity with the 3d person of the pronoun.—*Ur* (we) in Hungarian, may possibly be the root of the numeral *harom*, as well as *har* (= her) in the Thüringian provincial dialect; and ér (he) in German, may perhaps, as well as *ur*, be the root of *erek*.—Sie (= she) German, may be identic with the Zend and Persian numeral se, si.

*Trin** in the Gipsy language seems to form the transition from the Sanscrit *tri*, to the Hindostani *tin*.

Remarks on the numeral, 4.—The forms τεσσαρες, πιτορες, peduor and quatuor, shew us evidently, how the same root may be diversified and corrupted in different languages and dialects. Even the forms, fiorer, four and vier (pronounced fîr), appear to be corruptions of πιτορες by dropping the letter τ, just as the Persians have changed the *t* into *h*, (we might as well say, dropped it) in the Sanscrit, *čatur*, or the Zend, čatveré; or in a similar form of the same word in some other cognate ancient dialect.

Busbeck, a learned Dutch ambassador at the court of Constantinople, has in his operibus (Epistolis Turcicis) Amst. Elzev. 1660, an account of some men, whom he met with at Constantinople, and whom he believed to belong to *a very ancient* German colony in the Crimea. He gives a list of words of their dialect, many of which are evidently Teutonic, others belonging to quite a strange language. The numerals are: 1, ita, (in Icelandic: einr (masc.) ein (fem.) *eitt* (neuter); 2, tua; 3, tria; 4, fyder; 5, fynf; 6, seis; 7, sevene; 8, athe; (Icelandic ath).—*Fyder* is an important middle-link between πιτορες, peduor, fiorer, four and vier, and shews that the Teutonic *four* and *vier* are corruptions of πιτορες as well as the Persian chahar (čahar) is a corruption of chatur (čatur).

Remarks on the numeral, 5.—Just as the English have dropped the letter *n*, in the German *fünf*, and say *five*, so the Turks have dropped *n* in panj, and say, besh; and the Bohemians, according to the same analogy, have dropped the *n* in πεντε and formed pet (or rather p^i^et the pi being p mouillé), neither can I doubt that panj, πεντε, pimp, fünf, and five on the one hand, and *hing* and *quinque* on the other, are all of them, modifications and corruptions of one and the same root. The change, in sound, from *quinque* into *cinq* in French, makes this very probable.†

* I am not sure, however, whether my manuscript is here correct; perhaps the Gipsy word might be *triu*; for the materials contained in this treatise were collected more than 20 years ago, in Germany. Since that period, I had more important duties than "to ask every word for its passport, to know, whence it comes, and whither it goes."

† I do not mean to say that the Bohemians have *borrowed* their form of *pent* or pet (p^i^et) from the Greeks; but the Bohemians, as well as the Greeks, have either received this word from a tribe of middle Asia, from which both these nations branched out, or they (the Greeks and Bohemians) changed the (probably) original word *panj* (after their separation) analogously into πεντε and pent or p^i^et. This remark is applicable to many similar cases throughout this essay.

The English word, *pinch*, i. e. 1st, what can be (or is) taken with the five fingers; 2d, a squeeze with the (five) fingers, comes evidently from the Sanscrit and Persian word, *panj*: and if this is granted, it cannot be so very improbable, that also the word, bunch, i. e. a number of things tied together or united, (a cluster of dates, plantains) *like fingers*, comes likewise from *panj*. I must not omit mentioning that the word, *pincers* ("frequently mispronounced *pinchers*," as Walker says in his pronouncing dictionary), comes from *panj* likewise, and that the pronunciation *pinchers* is consequently *etymologically correct*, since the French have changed the word *panj* into *pince*, *pincée* and *pincer*, in all which words the idea of a *pinch* with the (five or less) *fingers* is prominent; e. g. *les pinces*, the hands of a crab; *une pincée*, 1st, what is, and can be, taken with some fingers, 2d, the little foot of an animal, &c.

If we consider that *panj*, *πεντε*, *fünf* and *hing*, are links in one chain of modifications of one root, we shall not think it an extravagance, to consider the word, *finger*, as a link of the same chain, and to believe that it means nothing else but *five*. Just so *δακτυλος* comes from *δεκα*, and in German, the word Dachtel (pronoun. Daḥtel) means a slap in the face *with the open hand*, or with the *fingers*, *not with the fist*. Δακτυλος means also, fructus palmæ, i. e. a *bunch* of dates. *Digitus* is only a softer pronunciation of *δακτυλος*, viz. *δακιτ* (*υλος*) or *δαγιτ* (*υλος*), and comes likewise from *δεκα* or decem (correctly pronounced *dekem*).

8. *Numeral* 6.	*Numeral* 7.	*Numeral* 8.
Lo, rocu Ch. & Japan.	Tsie, xici, Ch. and Jap.	Pu, faci. Ch. and Jap.
dhruh, Thibet	dûm, Thibet	ghiä, Thibet
alty, Turkish	saptam, Sanscrit and Tam.	ashta, Sanscrit
vietz, Armen.	sattam, Sanscrit Tamulized	hasht. Pehlvi & Pers.
shashta Sanscrit	septem, Latin	
shest, Bohem.	{ soptomoh, a, on, Sanscrit	
shestsh., Wendish	{ septimus, a, um	
shash, Persian	ἑπτα	oḥto, Gipsy
sex Latin.	haft Persian	οκτω
ἑξ	efta, Gipsy	octo, Latin
	sept, French	acht, (pron. aḥt) German.
sechs (pron. sex) German	sedm, Bohem.	eight, Engl.
chwch (pron. ḥuäḥ) Welsh	sais, Welsh	with, Welsh
hat, Hungar.	hét, Hungar.	huit, French

shesh, shishah } Hebrew
shedesh, { most ancient Hebr.
{ sittat, Arabic
sádisa (the sixth) Arab.
sitta, Maltese,
âru, { Tamul and Karnat.

yotn, Armenian
yedu, Turkish
hetu, Tahitian.
fita, { Cocoa Isl. New Guinea
wythou, Moses-Isl.
shib_ah, Hebrew
sab_at, Arabic
sebgha, (seb_a) Malta
sieben, German
seven, Engl.
siö, Icelandic
öṛu, ölu, } Tamul
elu, Karnat.

shmini, Hebrew
samániyat, Arabic
tmegnia, Maltese.
niólz, Hungarian.
osm, Bohem.
utn, Armen.
öttu } Tamul.
entu, Karnataka.

Remarks—1. I have compared the numerals of other nations, certainly not related to the Caucasian race, and have not found the least approach to an analogy, except those few which occur in the South-Sea-Islands. Some such numerals are the following:

Chili. 1.,	Agga 2.,	Eppo. 3.,	Quita. 4.,	Meli. 5,	Quecku. 6,	Cuyn.
Mexico: Ce.	Ome.	Iei.	Nahny.			
Viginia: Negut	Neesi	Nish.	Yau.	Napan	Negutta	
Karonas { t'r ko. / Hottentots { eit	} t'r koam.	t'n nonna.	hakka.	natahshe	tahshe	
Africans near the river Camerones. }	Mo.	Ba.	Melella.	Meleg.	Matan, cet.	

2. The preceding list of the numerals of the Caucasian race, shows that the roots of the numerals *three* and *seven*, have spread farthest, even to the South-Sea-Islands. It is remarkable that just these are the sacred numbers, and this fact may be considered as a collateral proof that Noachic traditions were preserved long in the minds even of nations so remote. Moreover we find that the root of the numeral *seven*, or *shibgha* (Heb.) occurs in several Indo-European or Caucasian languages, expressing sacred actions; e.g. *sevyoti* in Sanscrit, and *svetit* in Slavonic, mean, *he worships; σεβειν* in Greek means the same; *sebam* (செபம) in Sanscrit and Tamul means *prayer;* even *sabbath* appears to be derived from the same root and to have meant originally "*the seventh day's rest, the sacred rest;*" although in the Hebrew, as far as that language has been preserved to us in the Old Testament, the verb

shabath with some of its derivatives means merely *to cease from work, to rest,* likewise *to come to an end.*

9.—That also with respect to a variety of other words, there exists a close connexion between the Sanscrit, Greek, Latin and German languages, is well known to those who have made this branch of human knowledge the particular object of their enquiries, but I shall add here a list of Sanscrit words with their derivatives, in order to convince the uninitiated of this, and to draw the attention of scholars more generally to the comparative study of languages and dialects, especially of those in India, or connected with this country, principally Sanscrit, Armenian, and the provincial dialects in the north of India or in the Himalayan and Caucasian range of mountains; because by such studies much unexpected light may still be thrown on ancient history.

Onto* (Sanscrit,) andam (அநதம, Tamul), das ende (Germ.), the end.

oshono,— ——, asanam (அசனம, Tamul), das essen, the eating.

vidova, veduvei (வெதவை, Tamul), vidua, widow, wittwe (Germ.)

vohoti, vehit;—hence:

vahanam, vaganam or vahanam (வாகனம, Tamul), wagen (Germ.) = waggon.—Vaganam, corresponds exactly to the Latin, *vehiculum,* consequently this last word and *waggon* must be allowed to come from the same (Sanscrit) root.

vindoti, ' er findet (German) = he findeth.

valo, (Sanscrit) strength, = bala (Karnataka,) palam (பலம, Tamul), validus, valde;—bold,—balde, (quick, in German).

Likewise osti=ὀστεον=os, ossis;—oshion=os, oris;—vortute=vertitur; yunkte, = jungit and jungitur;—nidhi = nidus = nest;—modhyoh, medius, = μεσος = mid, middle = mitte and mittel (Germ).

Ondani, die enten (German) ducks. Tandovo = der Danz = dancing. Torsho = thirst = durst (Germ.) the root of which is probably, dürre (Germ.) = dry.—Ognih = ackini (அ±கினி, Tamul)=ohěn (n mouillé, Bohem.) = ignis.—Rotho = radam (ரதம, Tamul) = das Rad

* The Sanscrit words occurring in the whole of this treatise, have been taken from the ingenious and elegant work of Frederick Schlegel "On the Language and Wisdom of the Hindus" (adopting his orthography). This work first directed my attention to the treasures of Sanscrit literature; whilst another acute and eloquent philological writer, the Rev. Mr. Breidenstein, Ecclesiastical Councillor, and Chaplain to the Landgrave of Hesse-Homburg, led me to the comparative study of languages, and I gladly seize this opportunity to acknowledge that nearly every idea contained in my former treatise "On Original and Derived Languages," I owe to the latter gentleman.

(Germ.) = rota.—Yanu = γονυ = genu = knie (Germ. pronouncing the k,) = knee, (Engl.)—Rohito and roktoh = roth (Germ.) = red; hence ῥοδον = rosa; hence russus, rouge (French); also rutilus.

From rohito and roktoh comes likewise rettam (ரெத்தம்) and rektam (the blood) in Tamul;—naso = nasus = Nase (Germ.) = nose; nasi (நாசி in Tamul) = nostrils = nares.—Bhruvo = brow (of the eye) = braue (Germ.) = οφρυς. Namo = namam (நாமம், Tamul) = nomen = nâme (Germ.) = name (Eng.) = ονομα.

Monushyo = manushen and maniden (மநுஷன் and மனிதன் Tam.) = Mensch (Germ. pron. mensh). The root of it, man = mann (Germ.) exists perhaps also in Sanscrit; it is disguised in homo, *hominis* or in ancient Latin, *hemonis*, the *he* and *ho* being prefixed just as the Greeks do in some preceding instances; and the root, *man*, re-appears clearly in the compounds *immanis*, *communis* (*i. e.* what belongs to all men) *nemo*, *neminis* = *niemand* (Germ.) and probably in *humanus*.

Purushen or burushen (புருஷன், in Tamul, also in Sanscrit,) a husband, also *un homme fait*, has preserved itself only in the German word, bursche, pron. burshe, a young (strong) man.

Yugon, = jugum, = joch (Germ. pron. yoh) = yoke = ζυγον.

10. *Etymological Rules.*

The science of Etymology has been ridiculed as "changing consonants at pleasure and disregarding vowels entirely," but *then it is no science*, and I should be sorry if the present essay contributed to increase the attempt into which etymology has been brought by the dreams and hallucinations of some scholars, who have (*e. g.*) boldly derived *Mareschal* (*i. e.* Mareschalkus, the servant of horses, or the overseer of the royal stables), from the Hebrew, *mashal*, *to govern*.

Change of Vowels.

Every Hebrew or Arabic scholar knows how greatly the vowels change in all Shemitic dialects, but still *according to certain rules*, which science ascertains and scrupulously regards. In dialects which have not suffered from intrusive intermixture of strangers, the vowels interchange with as much regularity as in the Hebrew and Arabic, but in a different manner, and the words differ consequently in sound from those cognate dialects, so that they are unintelligible to the uninitiated, but he who has attended to the rules of those changes, can translate one dialect into the other, (as far as the vowels are concerned), almost without committing a mistake. Thus in the Thüringian provincial dialect, the Italian *a* of the classical German pronunciation, sinks into aw (as in crawl); *o* into *u*; *i* into *e*; and ö and ü become *i*. But if the inhabitants of one province settle in another, and form by intermixture

a new dialect, this regularity and consistency is disturbed and broken. Thus we find it in the English language and its dialects;—and thus we find it, if comparing Sanscrit, Persian, Greek, Latin and German words, which doubtless are identic, but where the changes of vowels are subject to no rule, and vary as much as the colours and hues of flowers transplanted into foreign climes and submitted to different treatments.

Change of Consonants.

11.—Those who observe how children, who just begin to speak, form their sounds, will remark that they, in their attempts to pronounce a consonant, are little guided by the ear, but they appear rather to have a distinct idea *by what organs of speech* each particular consonant is to be pronounced, and try to pronounce it accordingly. Hence a (German) child whom I requested to say after me, *kappe* (a cap) said, *happe;*—because he was aware that *k* must be produced by some operation of the throat, but being as yet unacquainted with the *manner of contracting* that organ of speech, produced the simple aspirate *h*. Many similar remarks I have made with respect to other consonants; and the following rules are but exemplifications of one general observation.

Consonants which regularly interchange in different truly cognate Languages and Dialects.

12.—The labials *w*, *v*, *b*, *p*, *f*, *pf*; but not *m*, it being of a nature different from the others of this class.—Examples: It is a fact that all words which in Tamul begin with *u* or *o*, begin in the Karnataka provincial dialects with *wu* and *wo*, (or *vu* and *vo*), and must in many cases, also be written and printed so; just as in the modern English the words, *one* and *once* (anciently pronounced in the same manner as *on* in *only*) are now pronounced as if written, *won*, *wons*.—The Canarese, having once begun a change, carry it regularly through, and pronounce the Tamul *v*, as *b*; e. g. Vadugen (வடுகன்), in Canarese : Badugen (from Badugu, north).—*B* in Tamul is *p* in Canarese; e. g. kobam is kopa.

Pf in the dialects of the mountainous parts of Germany, is always pronounced as *p* in the flat countries; e. g. pferd is pronounced perd, pard, part, in Nether Saxony. Thus pfennig in German, is penny in English.

13.—The linguals, *th*, *d*, *t*, *s*, *sh*, and *tz* interchange, but not *n*;—*r* and *l* seldom.

The English *th* is mostly *d* in German;* e. g. *the* is in German *die* (der, die, das);—*this* is *dieser, diese, dieses; than* is *dann;* and vice versâ, *do* is *thue* in German;—*door* is in German both *thür* (door) and *thoor* (a gate).

T in German is invariably changed into *d* in Nether Saxony, and mostly also in English; e. g. *saat* is *seed; blût* is *blood*.

S and *ss* in German is regularly *t* in the Nether Saxon dialect, and in English; e. g. *wasser* is *water*; *gross* is *great,* and in low Saxon, *groot; was* is *what; das* and *dass* is *that; zu wissen* (to know) is in English, *to wit; er weiss, er wusste* is *he wot; weiss* is, *white*.

Tz changes likewise invariably into *t;*—*hitze* is *heat; sitz, seat; witz* is *wit*.

Sch in German (pronounced *sh*) is mostly, if not always, *sk* in low Saxon, but seldom changed in English; e. g. *fisch* in German, *fish* in English, is *pisk* in low Saxon; thus *schiff* = *ship,* is *skip* in low Saxon.

14.—All the gutturals *y, g, k,* h (or the German and Scotch *ch*), interchange with the simple aspirate *h* frequently, as well as amongst themselves. *G* (according to the Romanizing system always pronounced like *g* in *give*) is pronounced in many German dialects, either like *k* or like h, softer and harsher; and that h is always pronounced, in Nether Saxony, and mostly also in England, like *k*, is well known.

15.—In other languages and dialects other changes of the consonants are observed with equal regularity. *Grimm* in his German grammar gives a specimen, and remarks that, if any word is found in these three German dialects, not changed in conformity with this specimen, it is certain that such a word is an intruder and not originally belonging to that dialect. (See Edinburgh Quarterly Review, No. xcix. Oct. 1833).

Greek and Latin.	*Gothic.*	*Old High German.*	*Modern German.*
πους	fotius	vuoz	fuss.
piscis	fisks	visk	fisch (pron, fish).
frater	brôther	pruoder	bruder.
τρεις, tres	threis	dri	drei.
οδους, οδοντος	tunthus	zand	zahn.
γενος	kuni	chunni	......
χορτος, hortus	gards	karto	garten.

16.—To show what great changes vowels and consonants undergo in a language, I cannot but transcribe two specimens of valuable remains of the old Saxon dialect preserved in the archives of Goslar, and which will prove particularly interesting to the English reader.

* For brevity's sake I use in this treatise, the word *German* for the classical, commonly received, polite dialect of Germany, which usually is called high German.

Vow of the Saxons against Charlemagne.

1. Saxon .... Hilli kroti Woudana; ilp osk un osken pana
2. Eng. transl. Holy great Wodan; help us and our banner lord
3. Mod. Germ. Heiliger grosser Wodan; hilf uns und unserm banner herrn

Cuitikin ok kelta of ten aiskena Carlevi ten slaktenera.
Wittikin (ae) .... against the (αισχρος ?) Charles the slaughterman.
Wittekind und .... gegen den .... Karl den schläḫter.

Ik kif ti in our un tou scapa un tat rofe.
I give thee an ox and two sheep and the robbed (prey).
Iḫ gebe dir einen Auerochsen und zwei schaafe and das geraubte.

Ik slacte ti all fanka up tien iliken Artisberka.
I slay for thee all captives upon thy holy Hercynian mountain.
Iḫ schlaḫte dir alle Gefangenen auf deinem heiligen Harz (berge).

Baptismal Vow of a captive Saxon Chief.

Hilken maktik koning Karelo, ick tin fanken Oddo,
Holy mighty king Charles, I thy prisoner Oddo,
Heiliger mäḫtiger könig Karl, iḫ dein Gefangener Otto,

pana of thousand, forsaki ten krotten Woudanabelta up
banner lord of thousand, forsake the great Wodan's image upon
banner herr über tausend, entsage dem grossen Wodan's bilde auf

artis barko. So ok all min godmanni ok krisknecti
the Hercynian mountain. So also all my vassals and war-servants
dem Harz (berge). So auḫ alle meine gutsmänner and kriegskneḫte

to kerstene. All min sittoma ok recto is in thin uuil
to Christians. All my possession and right is in thy will
zu Christen. All mein besitzthum und reḫt ist in deinem willen

ok anda. Wi bid di otmode um levens ok fridoms. Uui uuil
and hand. We bid thee humbly for life and liberty. We will
und hand. Wir bitten diḫ demüthig um leben and freiheit. Wir wollen

oldena bi Gotto almaktik ten vater, ten son, ten iliken ost,
hold by God almighty the father, the son, the holy ghost,
halten an Gott allmäḫtig den vater, den sohn, den heiligen geist,

so wi nu lernet, ok an di, us nadik konnink.
whom we now learned, also on thee, our gracious king.
so wir nun gelernet, auḫ an diḫ, unserm gnädigen könig.*

Anomalous changes of Consonants occurring constantly in certain languages.

17.—In consequence of the change of the labials occurring in the Canarese language mentioned in paragraph 12, there would be in that

* This second piece, by the way, shows the manner how the church of Rome made proselytes, and how people were baptised in those dark ages. In our days no Christian would do so.

language too great a number of words with *p*, and probably many misunderstandings would be occasioned. That nation has, therefore, been driven to an uncommon expedient, viz. to change the letter *p* into *h*, in all words which they have in common with the Tamulians. Thus the Tamul word, pon (gold), is pronounced, hon in Canarese; and Ponnur or Ponnavur is pronounced in Canarese, Honnavur, (generally pronounced *Honore* by the English); *patti* (பட்டி) a shepherd's hut, in Tamul, is hatti (hutti) in Canarese; hence the places Guzul-hutti, Dim-hutti, and many others.

Y (the consonant) in Tamul words is in Canarese constantly pronounced and written *s*; hence பெயர் or பேர் (peyer or pêr) is in Canarese changed into *heseru*. Also in some Tamul provincial dialects this change takes place, and some words of this class have come into the Tamul dictionaries; e. g. yamam (யாமம்) is also written *samam*. Attention paid to such peculiarities makes the acquirement of a language more easy and amusing.

18.—*S* and *r* exchange.—*Iron* is *eisen* in German;—*hare* is *haase*;—I *was*, thou *wast*, is in German, ich *war*, du *warest*; — δυς is *dur* in Sancrit, hence turasei, turitchei (evil desire) and turyosenei (evil thought, evil advice) in Tamul; *auris* is in ancient Latin, *ausis*, hence, auscultare; nasus=nares?

19.—The letter *h* becomes not only ḥ and *k* (as mentioned before), but also *s*; frequently it is dropped, sometimes it is softened down into the semivowel *w* and occasionally into *y*.

Mankind in their first stage of cultivation expressed their feelings and thoughts with unshackled freedom, warmth and energy; hence the simple aspirate *h* abounded in their dialects;—thus we find it still in a great measure in the remnant of those languages which were *most anciently fixed* by writing, as the Hebrew (with the Arabic), and the Sanscrit.

But when, by the increase of ideas, more words were required, and perhaps also merely in consequence of the greater exercise of the organs of speech, these aspirates were variously modified, in order to produce more words differing from each other in form and sound; and also when those tribes, by more frequent intercourse in different circumstances, found it necessary to give more substance, more body and bones, to their language; it may be supposed that the simple aspirate was in many cases changed into χ or ḥ, k, ج and خ. More particularly those tribes who removed to, and remained long in, wild mountainous countries, where the continual noise of the winds shaking the trees, made it necessary to produce still harsher sounds, as j, sh, ch; whilst those

who removed to delightful plains, and became comparatively mild in their manners and finally subdued by conquerors, changed the *h* into the milder *s*, (and subsequently into *t*) or into *w*, or lost it entirely. Hence in some European languages *h* occurs seldom, and the Tamulians have none at all, since they were, from the most ancient times, by various succeeding mountaineer-tribes, pushed to the southern plains of India and subjugated.

It is strange that the Greeks retained the *h* in most words, where even the northern mountaineer-tribes have an *s*; e. g. ἑξ, sex in Latin and German; ἑπτα, septem, seven;—ἁλς,=salz (German)=salt (Eng.)= Sal=Saul (Bohemian);—ἁμα=ham (Armenian)=cum; but in this case the Greeks have likewise changed *h* into *s*, as συμ=συν,(as well as into *z*, e. g. ξυν), *simul*, *sammt* (together) in German.

Another remarkable exception is that the Teutonic nations retained the *h*, where even the Hebrews and other nations living in milder climates and countries, have *a k*; e. g. horn=cornu=käirän (in Hebrew); —halm=calamus; house=casa; heart=Herz (German)=καρδια= cor; hollow=hohl (German)=κοιλος, (hence, *coelum*).

Mountaineers change frequently the *s*, into *sh*; hence this sound abounds in Sanscrit (which language was certainly formed in the Himalaya-range*). Hence the Swiss and the Swabians (the inhabitants of the mountainous country of the black forest) say, du *hasht*, instead of du *hast*; *isht*, instead of *ist (=est)*; and the Tamul, being a language of a flat and even country, has even a grammatical rule, according to which such Sanscrit words must be softened down; e. g. instead of the Sanscrit word *nashtam*, they write grammatically, *nattam*; instead of *rakshiden*, they write and say *rakiden*; instead of *sodisham*, *sodidam*; &c.

But since most tribes of the human race—before they finally settled where we now find them, and resided for centuries in very diversified climes and soils, until they were expelled, or emigrated of their own accord, since they intermixed with various other tribes (at least in many cases)—experienced numberless changes in their circumstances, we find now in their languages very many exceptions from the general rules here laid down. But I doubt not that, if those who are engaged in studying any language, kept these ideas constantly in view, comparing the words of such a language, with those of other languages and dialects with which they may be acquainted, and committing their observations and remarks to paper, they would be able

* Cellarius says: Brachmanes tandem commemorandi in hac India sunt. Non autem philosophorum modo generis et sectae id nomen fuit, sed *et gentis diffusissimae, cujus maxima pars in montibus degit*, reliqui circa Gangem.—The Brahmins, according to their own tradition, *originally came down to the plains of India, by way of Hurdwar.*

eventually to draw up such instructive lists as in paragraph 15;—they would not only be able sometimes to throw light on history, but would also make the drudgery of learning languages more easy and interesting to themselves. Much is still to be done and to be discovered by means of comparative study of languages. Somewhere in the Asiatic Researches, for instance, is a remark that a certain number of identic words, not apparently derived from the Sanscrit, seems to exist in all the languages and dialects of India.* If by the united endeavours of scholars in the north and south of India, a list of such words was produced, it would afford useful hints to the philologer, historian and antiquarian:—and attention bestowed on the rules according to which consonants change, would greatly assist therein.

20. — I now proceed to substantiate the preceding remarks, and select for this purpose the word ὕλη, which means, Ist, a forest or wood, silva, and 2d, branches, sarmenta (as in Anabasis, 3, 5 and 6) from which root, in each of these meanings, various derivations exist. Even the word *silva*, (more correctly sylva) comes from ὕλη, and the identity becomes more evident, if we remember that the Romans pronounced it also sylua (the u as a vowel, as in Horace, Ep. 13, 2).

ὕλη { Sylva = saltus = wald (German) = wood;—wild (English and German), sylvestris.
σύλη (a lost middle-link), hence ξύλον.
Holt (Spencer) = holz (German) *wood*, in the meaning of lignum and saltus.
κᾶλον, (lignum);—κῆλον (jaculum, the shaft being of wood).

21. It is mentioned above, that the words *horn*, *cornu* and *karan* are identic, but before I proceed to give a list of the derivations, I must remark that it is evident both from Revelation and from the nature and history of the languages now in our reach, that mankind formed them by the exercise of their mental faculties. A limited number of very simple (perhaps mostly monosyllabic) words was the common property of the primitive races. The Caucasian tribes, after their separation from the others, continued to multiply their words, partly by merely modifying the sound of a vowel or a consonant of a word already in use†

* I suppose kotel (a fort) is such a word; also *ûr*, *vûr* and *buri*, with their variations, buram, veram, bôre, pôre and pûr, meaning a village or smaller town.—After having written this, I find in the Madras Journal of Literature and Science, No. 13 page 398, the following statement: "There are in it" (in the Pali or Magadhi dialect), "words common to Telugu and Tamil, but not Sanscrit; lending some force to an opinion that a common dialect, not Sanscrit, once ran through the whole of the continent of India."

† An instance of the change of the *vowel* is κᾶλον and κῆλον; instances of the change of the consonant are frequent; e. g. the word *waffen* is pronounced in Nether Saxony *wappen*, (hence the English word *weapon*), and means, 1st, arms of offence and defence; 2d, the figure painted on the shields of the old Germans. But subsequently the word *wappen* was likewise received into the high or classical German, and means now exclu-

or partly by adding a letter or syllable (not to mention the prefixes), and partly by inventing new words, many of which were certainly onamatopoietic. Words which were formed by modifying the primitive root, always expressed ideas related to the meaning of that root; e. g. the original meaning of the primitive root of the Hebrew word karan קֶרֶן or in Greek, *καρηνον*, seems to have been, *skull*; but this root (kar or har) variously augmented, was applied to all which is about the skull, e.g. the hair, the horn (of animals) &c. and then, secondarily, such a modified and augmented word was used to express cognate ideas; as, hardness, strength, confidence, superiority, &c. If it is remembered that the dual and plural forms of kärän (in Chaldaic also karnah) are, karnayim, kranayim and kranoth, the correctness of the following etymologies will appear still more evident.

The primitive root, then, is *har*, and one of the first modifications is *καρη*; further modifications of har are härän, kärän and kran, and a modification of *καρη* is *κρας*. From these modifications the following families of words have sprung:

Har {
Hair (English) = haar (German).
(*Härän*) horn (G. and Engl.) = cornu; hirn (G.) = brain. cerebrum;—
corn = korn (G.) = grain;
καρη .... *κρας* } *καρειαρ* and *κραιρα*; *κερας*, *κερατος* and *κεραος*.
Kärän .... *καρηνον*;— *κορωνη* = (summitas et) corona.
Kran. .. { *κρανον*, *κρανος* *κρανειον* } (galea); *κρανιον* = cranium. *κρανεια* = cornus, (having *hard* stones),
crinis, (only used of the hair of the *head*)
κρηνη, a spring, or *head* of a brook.

From *κερας*, *κερατος*, the horn, the symbol of strength, are certainly derived those words in the Greek and other languages, which denote strength, superiority and government; as, *κρατος*, *κρατεω*, as well as the word, *hard*, (Eng.) = *hart* (German).—The word *κοιρανος*, comes most probably from *karan*; and *κυριος* from the simpler root, *kar*; just as *herus* in Latin, and *herr*, the lord, (in German), come from the still more primitive form of *här*; and I should have placed these two words in one line with *hair* and *haar*, had I not feared that this association would have appeared, at first sight, too extraordinary

sively, the *coat of arms*; whilst the word *waffen* means solely *arms*. *Knabe* means any boy, and was, like the softer English word (*knave*), originally used for the companions of knights, but subsequently the intensive pronunciation of this word (viz. knappe) was used to express this second meaning; as: *schild-knappe*, i. e. armour bearer; müller's knappe, i. e. servant of a miller, (pronouncing the *k*).

and nearly ludicrous. Reviewing all these various, but certainly correct, derivations, I cannot doubt that also κραλης (a king), and král in Bohemian, with exactly the same signification, and the German word, *kerl* (a young strong man), Latinized Carolus, and Charles, come from the same root.

I hope I shall be pardoned, if I add here a question, the decision of which I leave to Hebrew scholars:—Did Job (16, 15) really intend to say, I have defiled *my horn* with dust, (as Luther and the English translators have it)?—I think it appears very evident from the above etymological genealogy of the word *kärän*, even if there were no other proofs that it had in the original Hebrew two or three different meanings, viz: 1, the head; 2, the horn which grows upon it in certain animals, and 3, strength or glory (See also Ps. 89, 17—92, 11). And it is a fact that in the Hebrew as well as in the Arabic languages, there are many words which have two distinct (sometimes opposite) significations, where the connexion alone must decide; e. g. ḥattaath (חטאת) Deut. 9, 21. Lev. 6, 25, 30, and Zach. 14, 19. Every translator should surely strive to divest himself most carefully of the prejudices and mistakes of his predecessors, and to do justice to his author, so that the real meaning and context, as well as clearness, good taste and the modern idioms, be regarded. Job certainly meant to say, "I have covered *my head* with dust." The vulgate has, Operui cinere carnem meam;* but the Septuaginta have understood the figurative expression better, and have the word σθενος; and De Sacy, J'ai convert *ma tête* de cendre.

22.—Some other etymologies, both regular and anomalous, illustrative of paragraph 20, are the following:

El (êl, אֵל) a strong one; God; from this the Greeks have formed, consistently with the above mentioned rules, ἡλιος, and the Latins the word, sol;—and σεληνη seems to come from the same root;—ἑρκος, = kerker (Germ.) = carcer;—ἁλλομαι = salio = sally;—ἑσπερος = west? = vesper;—adim (Armenian) = I hate = odi (odium)=ich hasse (Germ.) = κοτεω; in this series of words, the aspirate is quite anomalously employed; *Hind*, *Sind* and *Indus*, where the Greeks have rejected the *h*;—ὑπνος = sofnadi and sveffn (Icelandic), = shvopno (Sanscr.). In Latin the π has been changed into the nasal letter *m*, on account of the following *n*, equally nasal, and thus the word *somnus* was formed; but on the other hand also they dropped the *n*, and thus, *sopio* and *sopor*, arose.—The Quarterly Reviewer, in the number above alluded to, derives the word *equus* from ἵππος, but this is not a scientific derivation, I would much rather compare the word *equus* (in

* Most probably the *original* Latin translation was: *cornu meum*, which a very early copyist changed into *carnem meam!*

Gælic) och (oh) with the word *ὤκυς*, and derive from *ἵπ* (*πος*) the syllable *cab*, which is the root of the word, *caballus*.*

23. The intimate connexion of the Japhethitic and of the Shemitic languages, as demonstrated in some of the preceding etymological deductions, is surprising, and deserves the attention and further inquiry of scholars. To prove that they are not quite solitary instances, I shall add here some more.

kol (קוֹל Hebrew / *καλεω* / to call } قال (dixit), Arabic ;=calo (ancient Latin, e. g. comitia calata,—nomenculator or nomenclator)= clamo ; *κλαγγω*, *κλαζω*= klang (the sound), Germ. ; klingen (to sound);—kalladi (he called,) Icelandic; kallen, to speak, (in the provincial dialect of Aix-la-Chapelle)—hallen, (to sound, resound,) Germ. ; gällen (to sound unpleasantly) Germ.

kara (Hebrew) { crier (French)=shreien (Germ.); kreishen (to cry or weep); cry ; *κραζω* = kricheti, pron. kričeti, (Bohemian).

ερα, *εραζε* Hesiod. *εργα*, 419 { ar * a (Chald.) אֲרַע and אֲרַעָה äretz ar * a (Hebr.) = Hertha, Dea Terra (Tacitus Germ. 40) = earth = erde, Germ. ;—wurzel = *ριζα*=radix. *αρις* = (herba, Hesychius);—*εριθος* ;—aro ; arvum ; ervum=*οροβος*.=erbse (Germ.)

Gib * ah (Hebr. collis) ; قبل (Arab) = cupola=kuppel (G.) ; gabal, (Hebr. to finish) :
κυφη { kuppe (summit, Germ.) ; caput ; = kappe (Germ.) = cap ; *κεφαλη* ; capillus ;—giebel, (summit of a house) Germ. ; gipfel, (summit of trees) Germ.
kopf (head, Germ.) = haubet (ancient G.) = haupt, (modern German) = head.

The derivations from kol and kara might be owing to onomatopoeia ; but not so those from *ερα* and *κυφη*. Some others of the latter kind are, shen (Hebr.) = zahn = dens = *οδυς* = tooth.—Manah (Hebr. to count, arrange, apportion) ; hence, *μνα*, *μνη* = mina ; money, mo-

* I cannot but transcribe from Professor A. W. von Schlegel's "Indischer Bibliothek" the following pretty French lines :

> Alfana vient d' equus sans doute,
> Mais il faut avouer aussi,
> Qu' en venant de là jusqu 'ici,
> Il a bien changé sur la route.—Ind. Bibl. Vol. II. No. I.

But notwithstanding the great change, I think it is evident, that the relationship of *ἵππος* and *caballus* is quite legitimate.

neta; mint (Engl.), minda (tribute, Chald.); from the same verb come μηνη = μανα (Doric) = moon = mahn (Nether Saxon), = mond (German);—mensis = month = monat (German) and μην, μεις, μεινος.

To sow, säen (Germ.) sara (Hebr.) { sevi;—semen = syme (Bohemian), = saame (Germ.) satum; saat (Ger.)=seed=zaat (Dutch)=sadeh?(Pers.) sero—sermn (= seed, Armenian). σπειρω;—διασπειρω = *dispergo; spargo;—σπερμα.*

24.—Thus we find the simplest roots in the Greek, Teutonic or Latin languages, and their derivatives in the Shemitic dialects, or in Sanscrit, whilst these two latter tribes have lost the root; so that we must conclude, first, that the Shemitic and Japhethitic tribes stood pretty long in close connexion, and secondly, that after the various tribes had dispersed over the earth, they continued to form new words by adding, and also by prefixing, to their common roots, letters and syllables, and this often so analogously that we find sometimes the very same form in Sanscrit and in Icelandic, whilst the intermediate tribes modified and augmented that same root in some other way. The Greek language has preserved to us the greatest number of the most simple and natural (apparently) primitive roots; and Sanscrit scholars will be able to say, whether many similar, most simple and primitive roots (not imaginary ones), are actually found in ancient compositions as self-existent parts of that language. The following genealogies of words may suffice to explain my meaning:

γαω, γεω Γη, the wife of Ουρανος and mother of all. { γαμεω;—γαμβρος = gener; bräuti*gam*, (bridegroom,) German. yanami (Sanscrit) γινομαι; γενος = genus = kind (Engl.);—γενειον = kinn (G.) = chin, ubi barba nascitur quæ protestatem gignendi indicat;—κοννος.

gigno;—genitus = (contracted into *kind*) a child (in Germ.) νηγατεος Il. Ξ 185.—γνησιος, gnatus, cet.

αω, flo, spiro {
Flo, *i. e.* I blow and breathe } αηρ; ανεμος; animus; anima, { atma & anima, Tamul
υπεραης Iliad Α 297—ηνεμοεις Iliad Μ 130. ζαης Il. Μ 157.; αητα Il. Ξ 254.
clamo; αυω Il. Α 461.2.; αϋτη Α. 466., αυτεω Μ 161.
sicco viz. by blowing. αυος, Μ 137.

ὕω pluo {
υετος, Μ 133; { ὑδωρ;—ὑδρως = sudor = swet=schweiss, (Germ.) wodu (Bohemian) = water = wasser (Germ.)
hyems = χειμων, χειμα
humor, humidus;—uvidus, udus;—ὑγρος cet.

Of the Dialect of the Todavers, the Aborigines of the Neelgherries.

2. There can be no doubt that an examination of this dialect, according to the principles laid down in this essay (or, according to improved ones) and a comparison of it with other languages and provincial dialects of India, will be the means, together with other collateral evidences, of discovering and demonstrating, if not with nearly mathematical precision, yet very satisfactorily, to what tribe the Todavers originally belonged, and about what time they may have separated and become an isolated race of mountaineers. And it may be expected that *one* beam of clear light being once thrown upon their history, it may afford a clue which will lead to historical discoveries relative to other tribes also.*

One third perhaps of the words of the Todaver dialect I cannot yet trace to any language with which I am acquainted; the other part is *Tamul*, but so disfigured, by a regular process of changing the letters, that such words are not easily recognized. They change the vowels nearly in the same manner as the Thüringian peasants do. Every vowel sinks in its pronunciation one or more degrees deeper than in Tamul, and the consonants are coarser.

They change *o* into *b*, or *p*;—*b* into *p*;—h or g is frequently changed into *k*; e. g. *pôgiren* போகிறேன is in their dialect, *pôkenn*; *s* is generally changed into *k*; e. g. sevi செவி is pronounced by them, kevvi,—*sînna* சின்ன ;—and vice versâ, kilei கிளி is changed by them into tzillu;—but the most peculiar change is that of *r*, *l*, ṛ, ர ல ள and ழ into a kind of *'sh* ஷ or ழ; yet so, that the consonants, the place of which this sound of *sh* respectively supplies, are in many cases distinguished by the ear; very much so as a distant object can be pretty distinctly recognised in the drizzling clouds so frequent on the Neelgherries. Their words which they have in common with the Tamulians, are mostly changed into monosyllables; e.g. müṛugu மிழுகு is changed into *meṛshk*;—ilei இலை into eṛsh; viragu விரகு is verg, berk and burk (for it is a known fact that all unwritten languages are very vague and unsettled in idiom and pronunciation); völli வெள்ளி is *bülṛsh* the *l* and ṛ, however, are so melted together, if I may say so, that they form one consonant, although both sounds be pretty distinctly heard;—*pal* பல is paṛsh; *puli* புலி is puṛi; pâl பால is polsh; *vill* or *villu* வில or வில்லு

* Although their language may appear to be a jargon, and they themselves may be degraded, yet they are *men*; homo sum, humani nihil a me alienum puto.—I scarcely need remind the reader, of Qamoos who was long seeking in vain for the correct meaning of two words, when writing his great dictionary, and learnt them at last from the mouth of some poor children in a little village.—Even in merely philological respects, the Todaver dialect is interesting.

is pronounced by them *bullu* or *pullu*, perhaps adopting in this case the pronunciation of the Badugers), their own original pronunciation is bursh and pursh* as if written in Tamul, புழ்ஷி ;—*nilam* நிலம is *neúlne*,†—*vanam* வானம் is *pône* ; vittu or videi விதது or விதை is *polt* ; varugirên வருகிறேன is *vashkenn*, or *varkenn* ; *tarugirên* தருகிறேன is *tashkenn* ; *irukkirên* இருககிறேன is üshkenn.

Instances of rejection of consonants are the following : Irul இருள is changed into ölu ; *vaüru* வயறு into *bîr* ; *veiyil*, வெய்யில into bîr or bîrsh (thus they call the sun) ; marei மழை into mâ ;—maram மரம into meunu ; and param, palam பழம into pôm—(this is the only instance which I have met with, where the Pali or Tamul termination of *m* is preserved) ; சமுததிரம is sotara. This word they have certainly received through their intercourse with the low country ; and it shows how they assimilate many foreign words to their idiom. Another clear instance is kâḫotz ; so they pronounce the Tamul word காகிதம or காயிதம (kagidam). More easy foreign words they leave unchanged ; e. g. the Hindustani word, *tuvi* (a kife) and the Canarese word, *bara*, to write, which is evidently also the root of the Tamul *vari*, வரி ; it is consequently not even certain that they have borrowed the word, *bara*, from the Canarese. It is remarkable, that they have adopted scarcely any Canarese word, as far as I can ascertain, although they have so much intercourse with the burghers or budagers.

Their grammar contains the rudiments of the Tamul, with several forms of their own ; e. g. nan pürandiruckiren நான பிறநதிருககிறேன is in their dialect ôn pêrdsh bimi—and in plural, om perder bumi, where the auxiliary, *I am*, *we are*, is expressed by *bimi* and *bumi*. Whether this is the case in any other Indian dialect, I do not know. They say also, *bini* instead of *bimi*. Their pronouns are, ân or on, I ; ni, thou ; athm and ath, he ; ôm, we ; nümmu, you ; athamm, they, atha, (neuter) ; the forms of the dative are for enacku enk' ; for unacku, nink' ; for avenucku, ânk.

Some phrases are : on üshkena bokena ? Shall I stay or go ? Ishenirkusu barkena ? Must I (do I) write like this ? Ninnûr perd-

* Dr. Zenker says in his work entitled "Plantæ Indicæ" as follows : Ut Specimen nomenclaturae vagae aboriginum exhibeamus, hanc arborem (Rhododendron nilagiricum) ab ipsis *Pullukumaru* nominari, adjici liceat. Cl. Ritter vero in opere suo geographico insigni (Erdkunde cet.) nomen *pursh* ab indigenis accepisse monet." Mara means, *tree*, in the Canarese. No alphabet could express the word *Pursh* correctly, as well as many other Todaver words, except the Roman with diacritical marks according to Sir William Jones' principles.

† Eu, according to the French pronunciation, as in peur ; the pronunciation of ŏ is somewhat different.

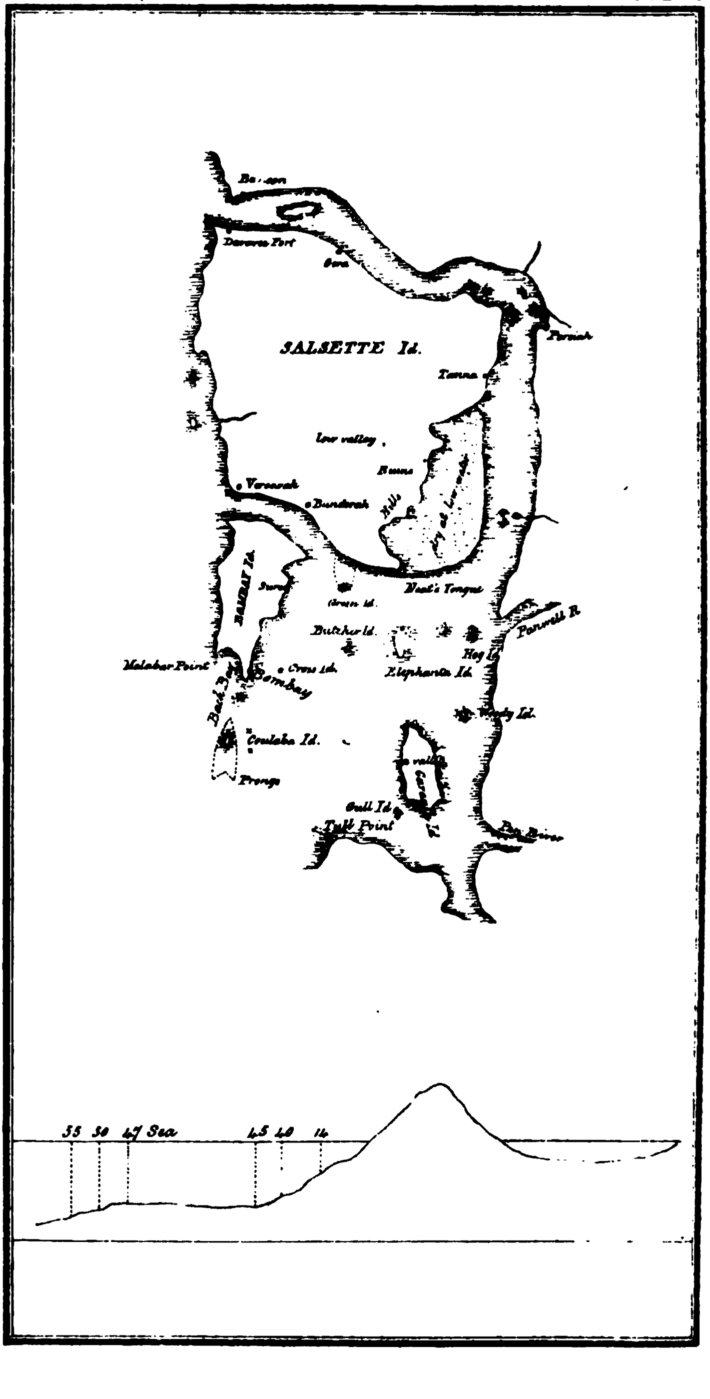
wudi ettodu ? unnôdu purandavergel ettenei ? Ninku kinnudu ettodu ? unacku sinnavergel ettenei ? Tölim euku kinnodu. Ellârum enacku sinnavergel. These specimens will suffice to show the great similarity of this dialect with the Tamul, although by no means its identity.

Some words, the origin of which I have not ascertained, are the following: *teckl*, or *teckl moḥ*, a man (moḥ is the same with maḥen); tuj moḥ, a woman; kuḥ, a girl, a daughter; ên, father, (ennên, my father); avv, mother; tûru (if written in Tamul: தாழு,) a plant; poḥ, red; tûvi, a feather; tashk, above; erk, below; wüldi, pleasant, good; ufn, the back; nobkôde, shoulder; mît, chin; mithu, whisker; moi, beard;—pevvêl, thumb, (vêl and veld, is the Tamul விரல) ; polvel, 3d finger; urndôri, (if written in Tamul: உளழ்ந்தோழி) 4th finger; erk koi, left hand (lower hand); parsh koi, right hand, (வலதுகை). Also the names of the week days may perhaps afford a clue, to discover this tribe's relationship with others; they are: Otsôm, or Ossôm, Sunday; Tuvôm, Monday; Om, Tuesday; Pudiom or Puduvom, Wednesday; Ta-âm, Thursday; Pülsh, Friday (வெள்ளி); Thunni or Etnat, Saturday (சனி); Etnor, a week (எட்டுநாள்). The identity of Puduvom and புதன்கிழமை, (Buddhu's day), is remarkable, and seems to be a proof that they are a branch of the ancient Buddhists. This idea seems to receive support by the fact, that they call the week etnor (*i. e.* eight days), just as the Teutonic nations, which coincidence intimates very probably an identity of ancient tradition or opinion. Puduvôm, Pülsh and Thuni are the only days the etymology of which agrees with the Tamul. They call also the star, *Venus*, Pülsh or Pürsh. Om, (Tuesday) being apparently the first day of their week, may likewise afford a clue to trace their origin, if any tribe in India, or elsewhere, should be ascertained to consider this day as the first of the week. This word is strikingly similar to the Hebrew word: yôm, a day. But this is the only word in their language which I have as yet observed to be similar to any of the Shemitic dialects. Their temples, (at least that of the five Cairn-hills near Peycâri), are called: Gudimana. Is this as much as Gudi's or Gaudama's (Buddhu's) court-yard, corrupted from, Gudamamanei ?—since manei (மனை) means court-yard in Tamul and Canarese. The termination of the verb in *i* as in bini, bimi, before mentioned, as also the negative form of the verb, as: kâneni (காணேன்), kâtteni (காட்டேன்), âreni or âriani, (அறியேன்) reminds one of the Sanscrit forms of dodami, dodasi, &c. Their numerals also, and the manner in which they have altered and abbreviated the Tamul ones, may afford a clue, if any other Indian dialect exists in which they are similarly pronounced. They are: 1, odd; 2, ätu, (or ait); 3, muthu, mud; 4, nalk (Canarese) and nank (ancient Tamul); 5, üj; 6, ôr, ôd; 7, ör, ud; 8, ötthu; 9, unbôth; 10, potthu;

11, ponnod; 12, ponnät; 13, ponmudshu; 14, pânk; 15, poyj; 16, par; 17, pör; 18, pottsh (in Tamul characters, பொட்ட்ஷி); 19, pônbôth; 20, övvôth; 21, övvoduddhu; 30, muppoth; 40, narboth; 50, etboth; 60, arroth; 70, örvoth; 80, öttvoth; 90, önboth; 100, onnûru; 101, onnur odd, &c.*

The little I could as yet ascertain of their traditions is the following—How the earth came into existence, they confess themselves ignorant of. The first God, named öônu, came out of the earth like mist. His wife is called, *Pinnar'wursh.* His son, *Têkerski,* is the governing god, before whom marriages and all other solemnities are performed; he is the same, they say, who is called, karta, by the burghers, and in the Konkani language. (The similarity of the words öon and *αιων* I think to be accidental, as I have found no other similarity between the dialects, or nations, of the Todavers and of the Greeks). One of the five kinds of Neelgherry-bees is called *pêtên* (*ten* means in their dialect both the honey and the bee); it once stung God, and therefore he decreed, that that kind of bees should never have much honey. Others relate that "god asked once the bee to show him, how it made honey; the bee refused compliance; and god tied it with a thread, and kept it prisoner for six days; the bee was obstinate, and god let it go again." When I could not suppress a smile at the narration, the Todaven who related it to me, added: "this is certain; I shall bring you a bee; you will see how narrow it is in the middle; that comes from the thread." I have not yet been able to understand sufficiently, what they relate about their own history; thus much I ascertained—They believe the first couple who resided on these hills was a man of the Iruler tribe and a Todaver woman; then came another couple, a Todaven and a Iruler woman, from the mountain *Cuppara* (which, they say, can be seen from Coimbatoor towards the western sea); but returned again to *Cuppara:* and when the first couple sent them an invitation to return, they refused to come."—The Royal Asiatic Society of Great Britain and Ireland, in a series of questions circulated many years ago, state that a kingdom of Jews in the south of Arabia was destroyed by Mahomed, and that many fled to the Malabar coast; and the question is added—whether any trace of the remnants of that people could be found in the adjacent countries? The striking similarity of the features of the countenance of the Todavers with those of the Arabians or Jews, as well as their own tradition of their having come from the western region, deserve attention, but nothing can be decided without a much more intimate acquaintance with their dialect, manners and traditions, than we at present possess.

* I am preparing a Vocabulary of the Todaver dialect with the explanations both in Tamul and in English, to serve as a primer and elementary book for schools to be established amongst them, and which I intend putting to the Press.—Since the Tamul alphabet is not suited to express many Todaver words intelligibly, it is necessary to adopt for this purpose the Roman alphabet with diacritical marks, whereby this work will, at the same time, become more generally accessible to the literary public.


SALSETTE Id.
Tanna
Low valley
Ruins
Hills
Vereavah
Bundrah
Neat's Tongue
Green Id.
Butcher Id.
Hog Id.
Panwell R.
Malabar Point
Back Bay
Bombay
Cross Id.
Elephanta Id.
Coulaba Id.
Prongs
Gull Id.
Tull Point
55
50
47
Sea
45
40
14

XIII.—Extracts.

1.—*Sketch of the Geology of the Bombay Islands.*—By Robert D. Thomson, M. D.

Although Bombay has been known to Europeans since the year 1509, when the Portuguese Viceroy Ameyda captured a vessel in what the historian of the time has termed "the River of Bombaim,"* no connected view of the geological nature of the islands and antiquities in its neighbourhood has hitherto appeared. It is with a view of contributing to supply this omission, that the facts contained in this paper, which were acquired by observation, in the course of a short residence in that presidency in 1832, were drawn up.

The mean of fifty-nine observations in May, June, and July, 1832, gave me 83° 14′ for the temperature of the harbour of Bombay. This includes twenty-seven observations made after the setting in of the monsoon, on the 14th June. But a period of thirty-two days, immediately previous to this date, affords 83° 43′ for the mean temperature of the hot season; and twenty-seven observations gave for the commencement of the rainy season a mean temperature of 82° 85.′ The average temperature for 1803 was 81¼°, and for 1804, 80½°; and the number of rainy days for these years 102.†

The quantity of rain which fell in June, July, August, and September 1817, was 104 inches.‡ On the 23d June 1817, no less than 9·3 inches of rain fell in one day. In fact, the inhabitants of temperate countries can form no idea of the quantity and force of the rain which falls between the tropics. The mean barometrical height for half of 1816 and 1817, was 29·986 inches.

The harbour of Bombay, situated on the Concan, or Pirate Coast of the western peninsula of Hindostan, is possessed, as its name implies, of peculiar excellence and capaciousness,§ and has, therefore, been considered of great value ever since it became part of the British possessions. It may be described as forming the southern portion of a rectangular bay or recess, which lies between Tull Point in N. lat. 18° 47′ and Basseen, in N. lat. 19° 19′, and between the parallels of E. long. 72° 47′ and 73° 3′, possessing, therefore, an extreme length of thirty-two miles, and an average breadth of sixteen miles. The island of Salsette occupies seventeen miles in the length of the northern part of the bay, acquiring a breadth of from fifteen to seventeen miles, while its circumference has been computed at seventy miles.

* Sousa's "Portuguese Asia," Tome, i. p. 146.

† Ann. of Philosophy, xiii. 145.

‡ Ann. of Philosophy, xii. 212.

§ From the Portuguese *Buon-Bahia*, good bay. The accompanying chart of the harbour and islands of Bombay, I have enlarged from that of Laurie and Whittle.

A considerable proportion of the remaining part of this bay is occupied by Bombay, Caranja, Elephanta, Butcher, Woody, and Cross Islands, which, being disposed in a crescentic manner, form the harbour of Bombay, an open and extensive bason eight miles in diameter, affording good anchoring ground and secure shelter for fleets of ships of the largest burthen. It is these insulated portions of land, that I have designated the Bombay Islands. The appearance presented by these islands is highly picturesque, as they are in many places adorned with thriving woods, which, between the tropics, always produce rich and refreshing scenery. But, in the Island of Bombay, the present trees appear of recent origin; for, we learn from older writers that the land was formerly swampy, and afforded no plants or trees worthy of mention. At present the higher parts of Salsette and Caranja are nearly destitute of trees, but they are for the most part thickly clothed with straggling jungle.

The general contour of these islands corresponds closely with that of the adjacent continent, and far as the latter has been investigated, the formation appears identical. The altitude attained by the rocky masses in these insulated lands is never great, although they are all considerably elevated above the level of the ocean. The dark hills of Salsette reach the greatest height, next to them in order come the rugged masses of Caranja and Elephanta, but Bombay and the remaining islands approach more nearly the character of plains.

Before taking a separate view of each of the more considerable of these islands, it seems satisfactory to present at one view a description of the rocky masses and minerals, which form their essential constituents, and here it may be premised, that the rocks belong all to that class which has been termed trappean, or, theoretically, volcanic, as distinguished from the granitic series, or plutonic rocks.

1. Basalt, occurring in *situ* at the ruins of a chapel in Salsette; colour, dark-gray, or blackish, with numerous crystals of olivine and augite interspersed; fracture, irregular, dull. The upper portion of the ridges in Salsette appears to consist of this rock, or modifications of it.

2. Black basalt, in Elephanta, often presenting a homogeneous aspect when fractured, but frequently containing minute portions of olivine, sometimes in rounded granules, at other times crystallized; texture highly indurated. This and the former variety, fuse before the blow pipe *per se* into a mass, resembling pitchstone. The celebrated figure of the elephant, close to the village of Gallipooti, consists of this rock but it appears to be of limited extent.

3. Amygdaloid, appearing at the great temple of Elephanta, possesses a hard wacké basis, containing cavities filled with rock crystal and zeolites, &c., some of which are often met with enclosed in the strong mass in the form of rounded nodules, whose crystalline structure is not

apparent until they are transversely fractured. The rock has a purplish aspect, and is evidently decaying in many situations, by the readiness with which the atmospherical influences act by the medium of the amygdaloidal cavities. Before the blowpipe *per se* this rock simulates fused basalt.

4. Yellowish gray claystone porphyry, at the lower cave of Elephanta. The predominating particles have a yellow resinous appearance, with a black basis.

5. Green claystone porphyry, appearing at Baboola Tank; fine-grained, and admitting of a good polish, interspersed with dark-coloured soft particles, which have an even fracture, and appear to be small masses of indurated clay.

6. Amygdaloid, with a light coloured porphyritic basis and green cavities, accompanied generally with large crystals of calcarious spar, from the neighbourhood of Parell. The calcarious spar is sometimes dark-coloured, probably from the effect of reflected light upon it in its impacted situation.

7. Numerous large fragments of shell conglomerates may be observed on the shore of Elephanta, consisting of a nucleus of porphyry, or amygdaloid, closely surrounded by adhering bivalves, which afford means of extending the limits of the growth of the mangrove.

The amygdaloidal cavities contain numerous species of various classes of minerals, but those which are of very common occurrence are included under these genera.

CLASS I.—ACIDS. GENUS, SILICA.

1. Rock crystal—termed *Palunca* in the Malabar language, *Spadika* in the Grantham dialect—occurs very abundantly in each of the islands, in the form of crystals, varying from the most minute size to half an inch in length.

2. Common quartz.

3. Milk and Rose quartz.

4. Chalcedony.

5. Amethyst.

6. Agate.

7. Carnelian, rare in the immediate neighbourhood of Bombay.

8. Oriental jasper, or blood-stone, also rare, but abundant in Guzurat and Cambay.

CLASS II.—ALKALIES.

I. GENUS LIME.

Calcarious spar.

II. GENUS ALUMINA.

1. Mesolite, whose composition is expressed by the formula 3 Al. S + ($\frac{2}{3}$ C + $\frac{1}{3}$ N) S^3 + $3\frac{1}{3}$ *Aq.**

* The result of an analysis by me. *Jameson's Journal*, 1834.

2. Heulandite, observed frequently in Caranja and Elephanta, appearing in the form of large white crystals.

Of this last genus the number of species in India will be found extremely numerous; indeed there can be little doubt that this country will afford an immense field of discovery for future mineralogical investigators, nor is the scantiness of our mineralogical knowledge of India so much to be wondered at, when we reflect that, as yet, scarce a single addition has been made to our lists from the British possessions in the East, where, of all portions of the globe, geological facts point out the certainty of the greatest mineralogical stores.

The agate occurs in the form of round nodules, as well as in flat waterworn cakes. The chalcedony forms a basis generally upon which the rock-crystal and amethyst are seated, and in one beautiful specimen procured in Caranja, fine crystals of heulandite are similarly placed. The mesolite occurs in large radiated crystals, and likewise in the state of a lump-sugar appearance, which, when fractured, exhibits minute, slender, silky-like crystals, disposed in a radiated form.

Carnelian may be procured in the bazars, brought from Cambay, where it seems to exist in considerable abundance. It appears that the specimens of this mineral which are worked into ornaments, are principally obtained from the neighbourhood of Broach, by sinking wells in the dry seasons in the channels of torrents, at the bottom of which they are found lying in the form of round nodules, intermixed with other rolled pebbles, probably forced by the impetuosity of the mountain streams from greater elevations, and generally weigh from a few ounces to two or three pounds.

Some of them are red, others pink, but the most delicate and beautiful is certainly the colourless or opaline variety. There can be little hesitation in affirming that similar sources of this mineral exist in the beds of the numerous streams which abound between Bombay and the Ghauts, and which add so materially to the grandeur of this romantic region.

A beautiful variety is brought to Bombay, containing elegant arborizations resembling the ramifications of inclosed mosses, a phenomenon which in many instances appears to be justly attributable to such a cause.*

Bloodstone, or oriental jasper, as sold in the town by the Parsees, appears also to be imported from Guzurat, and the adjacent territories. It is characterized by presenting a greenish appearance, with numer-

* The remark of Pliny, "Infestantur plurimis vitiis—aliis capillamentum rimæ simile," with regard to rock-crystal, refers to the presence of Titanite. *Hist. Nat, Lib.* xxxvii. c. 2. The same naturalist observes of rock-crystal, "Oriens et hanc mittit, sed Indicæ nulla præfertur." *Hist. Nat.* xxxvii. 2. Which is ignorantly denied by Garcias ab Orto, who was for several years Viceroy of India. He says "Nullo autem expredictis loco crystallus invenitur quemadmodum nec per universam Indiam." *Hist. Arom. et Simplic Lib.* 1. c. 47, p. 171.

ous blood-red streaks or veins traversing it in various directions. It is to the latter species, or to the mock pearls so frequently employed as ornaments by the inferior castes, that we are to refer the expression of the historian of Alexander: " lapilli ex auribus pendent."† But with regard to the " Gemmas margaritasque mare litoribus infundit," it is not easy to give a satisfactory explanation, although the latter obviously relate to the pearls of the Indian seas.

We proceed now to a separate sketch of the islands, in the order of their importance.

Bombay Island.

The whole island may be considered as a plain, variegated on the east with considerable undulations, which form the small eminences termed Mazagon, Parell, and Oblong Hills. The southern part divides into two necks of land, of which the eastern portion, a low and flat surface, affords the site for the Fort and Dungeree, or the Black Town, and leaving an intermediate space called the Esplanade, terminates at Mendam's Point, the commencement of the Coulaba Causeway. The western promontory is considerably elevated, consisting principally of Malabar Hill, which lies near the entry of the harbour, and terminates at Malabar Point. Included between these points, with a crescentic outline, as between the prongs of a fork lies Back Bay, a considerable portion of water, with a sea communication, occupying a span of 2¼ miles, the total mean breadth and length being about 1¼ and 1¾ miles respectively. The water is shoal, having a depth of 2½ fathoms in the centre, and contains several sands, sunken rocks, and others exposed at low water.

The essential composition of this tract is claystone-porphyry and amygdaloid, and in some places, as on Malabar Hill, basalt shews itself, each corresponding with the varieties described, but seeming to vary with regard to the proportion of the basis and the magnitude of the cavities, and consequent quantity of the mineral contents. From Mendam's Point, a ledge of amygdaloid runs out south-west by south, to form a junction with Coulaba or Old Woman's Island, a flat and rocky mass, thinly covered with soil, which barely conceals the subjacent rocks, bearing every mark of having been at some period a continuous portion of that promontory of the island of Bombay upon which the town is situated. Advantage has been taken of this ledge to form a connecting causeway between the two islands, which is left quite dry at low water, so that a free land communication may be kept up in such circumstances. The prevailing rocks in this little insulated land are the same as those already mentioned, with the occasional appearance of basalt as if in dykes. At the southern point a dangerous rocky mass extends out to sea

† Quint Curt Ruf. l. viii. c. ix.

nearly three miles in length, assisting, with the aid of Tull Reef, in rendering the mouth of the harbour extremely narrow, for, if we deduct these obstructions to navigation, its span is not above four miles, although the distance from Coulaba to the nearest point of the continent equals seven miles.

The Coulaba Reef has been termed, from its forked figure, the Prongs, and appears to consist of the general rock, in a highly indurated form. The same series occurs at the New Bunder, by the Apollo Gate, where the amygdaloid appears to lie over the porphyry, which is is very hard when first exposed, and is employed as a building material. The New Bunder is formed of it; but notwithstanding the excellent quality of the stone for enduring the effects of aqueous friction, it is remarkable that an effectual plan has not been fallen upon to render the building of the jutty durable, as it is continually undergoing displacement from the action of the tide. The utility of the Bunder cannot be disputed for the numerous ships which annually increase in frequenting this excellent port, and the situation of this quay, from its being exterior to the fort, is very important, and is perhaps safer than the old Bunder during the height of the moonsoon.

To the north of the town the surface begins to rise gradually until the small eminence of Mazagon is formed. Beyond it are Parall and Oblong Hills, all preserving a rounded outline, thinly sprinkled with cocoa-nut trees *(Cocos nucifera)*, and affording some pasture land. At Baboola, a tank has been cut out of the solid rock, supplied with a broad flight of steps, to enable the inhabitants to have free access to the water, which they employ for all purposes. It is from similar reservoirs that the principal supplies of water for domestic purposes are obtained, and for the use of the crews of ships visiting the harbour.

As much discussion has taken place with regard to the influence which water procured from such sources may have upon the health of seamen, by affecting the alimentary canal, and, as the solution of the difficulties of the inquiry are very closely connected with the geological nature of the country, a few words upon the subject may not be out of place here. The whole of the soil which covers the island being extremely thin, it is obvious that the bottoms of the tanks, which are several feet below the level of the surrounding surface, must consist of solid rocks, and the margins being fortified with artificial building, we see that the water can have little opportunity of acting upon the soft soil, so as to produce a mixture of the earthy particles, and hence, that the substances of a saline nature in solution must derive their origin from the disintegrated rocky mass. A muddiness, however, generally exists in these waters, which appears to be produced by the agitation excited by the natives entering for the purpose of carrying off the water, and for bathing; but the proportion of mechanical mixture thus occasioned does not necessarily exist in general to any greatly appreciable amount, because, when the cause of excitement is removed,

the commingled matter speedily subsides. The temperature is always equal or above that of the atmosphere, and in the dry season may be rated at from 80° to 86°. It affords the following results with re-agents :—

1. A solution of acetate of lead produces a copious white flocky precipitate.
2. A slight precipitation with oxalate of ammonia.
3. A muddiness with muriate of barytes.
4. A milkiness with lime water.
5. A precipitate with nitrate of silver.

From these facts we may deduce that the water contains in solution (1.) a quantity of vegetable or animal matter. Judging by the eye of the relative proportions of the precipitate by acetate of lead in the Thames and Bombay water, we should be inclined to refer the maximum to the former, and no one will affirm that the water procured from the Thames is pernicious to health.

(2.) Small quantities of
Chloride of sodium
Sulphate of lime
Carbonate of lime.

The animal and vegetable matters are derived, there can be little hesitation in concluding, from substances which readily gain admittance in consequence of the exposure of the tanks, and the presence of the saline matter must be attributed to the same sources as in other similar situations, their small proportions being explained by the want of free communication between the water and the soluble portion of the earth.

The rock of Baboola is close grained, and is extremely hard, approaching in some measure to a green stone, as it appears sometimes in Scotland, with the aspect of an aqueous deposit. It affords an excellent material for mending the roads, which for their smoothness cannot be surpassed. This rock appears limited in its range; for at Parell, amygdaloid occurs with very large cavities, filled with the usual mineral. The northern portion of the island is similarly constituted, presenting nearly a level surface, thickly clothed with a great variety of trees and shrubs,* which afford a grateful shade from the over-

* Among the trees of the island, the *Ficus religiosa* and *Indica* are the most stately, which appear to have attracted the attention of Europeans, as early as the time of Alexander the Great, if we may judge from the admirable description of Quintus Curtius, " Plerique rami instar ingentium stipitum flexi in humum rursus, qua se curvaverant, erigebantur, adeo ut species esset non rami resurgentis, sed arboris ex sua radice generatæ."—Q. *Curt. Ruf.* lib. IX. c. 1.

" Branching so broad and long, that in the ground
The bended twigs take root, and daughters grow
About the mother tree."—MILTON.

The variety of trees and shrubs is great, but perhaps, the finest ornaments are, *Morinda citrifolia*, *Capparis acuminata*, *Artocarpus integrifolia*, *Terminalia alata*, *Getonia floribunda*, *Michelia champaca*, *Mimusops elengi*, *Grewia microcos*, and *Orientalis*, *Annona reticula* and *squamosa*, and *Tamarindus Indica*, which if any members of the vegetable kingdom can be considered as indigenous in this island, must hold the highest rank.

powering influence of the solar rays, "vim solis umbræ levant." The coast is low and rocky with the water gradually shoaling to the land, which at ebb tide leaves a dry and pleasant beach. The amygdaloid shews itself frequently in the form of half sunk rocks and dangerous ledges, especially along the Coulaba shores, but suffering in the lapse of time from the action of the sea, and occurring remarkably in conjunction with the clay-stone porphyry, the latter often rising up between two rounded masses of the former, sometimes placed above it, at other times under it, both being traversed frequently with basaltic dykes. All these rocks at the shore may be observed covered with shells, and their surface with a decomposed powdery matter, which on inspection turns out to be the basis of the rock crumbling into dust. At the distance of two miles from the town, many of the shells which abound so profusely on the sea-shore are calcined, by which process, they are converted into caustic lime, which the natives term *chunam*, a substance in great request, both as a mortar, and as an edible rolled up in the *betel leaf.* The latter habit, which has been denominated by some writers a luxury, ought rather to be termed a necessary practice, as we find it prevailing wherever the sole articles of diet are procured from the vegetable kingdom, the different substances employed fulfilling the same end, whether it be on the coral rocks of the Pacific, the arid deserts of Africa, or the interminable forests of America.

Salsette Island.

The description of the geological structure of one of these islands, may be said to include almost the particulars of the whole, but for the sake of greater perspicuity, we have ventured to consider them separately. The essential composition of Salsette, is clay-stone porphyry and amygdaloid, corresponding with those rocks in Bombay, but basalt occurs in very considerable tracts, and assumes more decided forms. The island is very irregular in its surface, consisting of ridges and intervening valleys, which in combination afford agreeable scenery.

The basalt forms two ridges which run parallel to each other, the one on the west and the other on the east of the narrow strait which separates the island from the continent, appearing above the amygdaloid which forms the base of the hills; and therefore, leading us to conclude, that its ejection has been subsequent to that of the amygdaloid.

The alteration which the eruption of the basalt has produced on the masses through which it has been forced, by rendering the two rocks at the point of contact similar, and as if passing into each other by a gradual transition, are sufficiently obvious; but at the same time, the two varieties are as distinct as any of the projected series in general appear, so that in a theoretical nomenclature (the establishment of which, it

must be admitted, it not for the advantage of science), not only the varieties of the trap formation should be discriminated, but the whole group should have an appellation, indicative of its production at a distinct period, and under different circumstances, from modern volcanoes. The term subaqueous volcanic rocks, expresses the hypothetical nature of their ejection.

In the centre of the island are situated the celebrated temples of Salsette, or rather their remains, since they have received great mutilation, not from the influence of natural causes, which from the hardness of the rock of which they are formed, they are calculated in a great measure to withstand, unlike the polished remnants of Greece and Rome, which are daily dissolving in the very rains which nourish the earth,* but from the hands of barbarous men.

It is not our purpose to describe them; it is sufficient to refer to accurate details respecting their appearance and size, which have afforded subject of admiration to numerous ages.† They are literally caves in hills, composed of porphyry and amygdaloid, thus differing from the pagodas on the coast of Malabar which consist of black basalt.‡

The Portuguese, who were the first European settlers in this country, justly merit the high degree of reprobation, which has been attached to their conduct, in the destruction of these extraordinary antiquities, for they must have been infatuated with the most determined intention of mutilation. The date of this dilapidation may be reckoned about the year 1564; as we learn from the historian of that period; that D. Antony de Noronha, the 9th Viceroy, and 23rd Portuguese governor of India, who succeeded John de Mendoça in 1564, and held the office till 1567; finding the people incorrigible, notwithstanding the exertions of the religious of the society of Jesus, who had laboured indefatigably for the conversion of infidels, and had sent some of their number into the island of "Salsette," which contained 66 villages of pagans; destroyed all their pagodas to the number of 200.§ The soil in this neighbourhood is highly improvable, if we may judge from the flourishing appearance of the gardens at Powey, and the quantity of produce raised. In the low valley which runs towards the centre

* Davy's Consolations in Travel, Dialogue vi.; p. 266.

† Gemelli Careri, vol. iii. p. 36. Asiatic Society Trans. vol. iv. Sousa notices a tradition that a subterraneous passage exists between "Canari," and Cambaya, running under the sea, which was the work of Bimilamansa, who was king of all that country in the third century. Others attribute the work to the holy prince Josaphat. F. Antony de Porto, a Franciscan, is said to have travelled for seven days in this passage, without arriving at its termination. Sousa's Asia, tom. ii, 258, 395.

‡ Sonnerat Voyage aux Indes, tom. ii. c. 4.

§ "Portuguese Asia, by Manuel de Faria y Sousa, translated from the Spanish by Capt. John Stevens." Lond. 1695, 3 tomes 8vo., tome iii. p. 14, tome ii. p. 253. The original title of the work is Asia Portuguesa, 3 tom, fol. Lisboa; 1666-75.

of the island, the surface is completely covered with a coating of salt, left by the evaporation of the sea-water, which periodically inundates the low ground. This salt in its impure state is employed as a condiment by most of the natives and naturalized inhabitants of the neighbourhood. Without drawing any very general or sweeping conclusions, from the fact of the existence of a recent salt deposit in this situation, we cannot fail to remark, that an extensive formation is actually in the course of being produced, for the product of the disintegrated rocks, will obviously be spread successively over each saline residuum, and as each new bed is laid, the substrata will acquire additional firmness and solidity, combined with the agency of the high mean temperature, which the most trivial observer will detect as a powerful agent in tropical countries, in binding together the most arid particles.*

This valley is formed by a break in the continuity of the basaltic ridge, the southern portion of which terminates here, but resumes its altitude and course near Tanna. The vale is overlooked by the hill which forms the extremity of the ridge. The ruin of a Portuguese chapel crowns its summit, consisting of the basalt, (a gray rock with augite crystals interspersed, which forms its foundation, No. 1). At the base of the ridge near the shore is a similar ruin, built of porphyry, and at each of them there is a corresponding inscription on sand-stone tablets, which must evidently have been procured from a great distance.

The words of the inscription are contracted, and are in the Portuguese language. They relate to some individual of the name of Aquias, probably a priest, as the word *sevsesdres* occurs; and the dates of the 2d of April 1620, and 28th November 1630 appear.

Near it is situated a Mahometan garden, neatly laid out in the English style, with grass walks, flower and vegetable borders, and a variety of fruit trees.

The ascent to the summit of the hill is rendered difficult, by the abruptness of the declivity and the loose fragments containing mesolite, chalcedony and quartz nodules, which readily yield to pressure, and roll to the base of the hill. The degradation of rocks cannot better be observed than in this neighbourhood, where we see them comminuting, rolling to the base and assisting in elevating the level of the valleys, and diminishing the relative height of the hills, of which a similarly striking illustration is afforded at the north-west side of the Pyrenees.† The product of this disintegration is well expressed by the German epithet, *geschiebe*, the *ratchill* of the miners, and must necessarily constitute the most recent formation wherever it occurs.

* Some distinguished geologists have attributed the colour of the red sand-stone to the ferruginous parts of the porphyry, from whose disintegration, they consider this formation to be derived. Humboldt Essai geognostique sur le Gisement des roches, 2nd Edit. Paris, 1826, p. 203.

† Link's Travels in Portugal, 8vo. 1801, p. 64.

From the summit of the hill the prospect is very fine, the east view being bounded by those extraordinary trap mountains whose configuration is so well expressed by their names, Funnel Hill, and the Queen of Mahratta's Castle, with the connecting ridge of the ghauts. While, to the south, the harbour and islands of Bombay appear as if at the feet, and to the north, the dull high land terminates the prospect, the foreground being enlivened by the rich foliage of the tamarind (Tamarindus Indica) and lofty palmyra, (Borassus flabelliformis) and the more humble, though not less elegant jungle, consisting of the Ixora (Ixora coccinea), Euphorbia (E. neriifolia), and Lawsonia (L. inermis).

On the north-eastern side of the strait which separates Salsette from the continent, a low basaltic ridge extends for four or five miles parallel with the ridge of Salsette, and with the ghauts, presenting, wherever the rock is uncovered, a columnar structure, and in three places, clusters of columns rise up, some of which are fifty feet high and twenty inches in diameter, the shafts being variously four or seven sided.*

Elephanta Island.

The form which this island presents at a distance is somewhat pyramidal, but on a nearer approach it is found to consist of two distinct hills, with an intervening valley. This vale is profusely studded with trees and bushes, as well as the hills, which are clothed with wood from the water's edge to the summits. Many of the trees are tall and stately, as the brab or palmyra, while others are covered with the densest foliage, as the tamarind, with its rich green leaves and elegant blossoms. In the dry season the island exhibits the best appearance from the summits of the hills, or by approaching it from the sea, for at that time the earth is dry, parched, and as if baked, being crossed in every direction with fissures, which greedily suck up the rain whenever it happens to fall, and, of course, is destitute of that rich vegetable carpet which covers it during the prevalence of the monsoon. Then the soil is one mass of verdure; not a spot is naked; the paddy ground being enlivened with the presence of the rice crop, and the forest waste adorned with grasses and elegant flowers. The rice ground is very limited, and is situated at the lower part of the vale, in the immediate vicinity of the village of Gallipooti. It is divided into parterres, or small inclosures, fenced with impervious hedges of pricklypear (*Euphorbia neriifolia* and *tirucalli*). The whole island is one mass of rock, and the thin scattering of soil which hides but scantily the main constituent of the island, is merely derived from

* Ann. of Philosophy, vii. 309.

the disintegration of the latter. At the southern landing place there is a ledge of large masses of amygdaloid (of which the cavities have been washed empty, if we except a few nodules of quartz), over which the surf beats high and renders landing dangerous, although it forms one of the few situations in these islands, where boats can reach the shore without grounding.

Near this landing place is a Portuguese ruin, situated on a knoll; and adjoining it, we discover the extraordinary artificial figure from which the island derives its European name, for its Hindoostani name is Gallipooti. The animal represented by this sculpture is evidently an elephant, fully equal to the natural size, and, upon the whole, well executed. The trunk and head have been separated from the body, and lie fractured and prostrate on the ground. Considerable damage has been done to other parts of the figure, for the instrument of which we must have recourse to the tradition current in that neighbourhood, which states that the Portuguese went so deliberately to work as to employ cannon in effecting their barbarous work of destruction, from the idea, as we have shewn, of extirpating superstition! The rock of which the figure consists is a very hard basalt, containing a few minute cavities, scantily supplied with mineral crystals, and is of the same nature as the rock of the adjoining hillock. From this spot the ascent of the western hill is pretty easy, the pathway leading along the bed of what constitutes a torrent during the wet season, formed in the porphyry and amygdaloid, and runs to a considerable depth; a kind of natural walls rising up on each side, which are overshadowed by carissa bushes (Carissa carandas), agnus castus* (Vitex trifolia), the garruga tree (Garruga pinnata), with its abundant fruit hanging in clusters, like the produce of the vine, and castor oil tree (Ricinus communis), while the soil is ornamented with the solanum (Solanum jacquini), and the Mexican Argemone† (Argemone Mexicana). About half way up the hill, the smaller temple or caves are reached. They are three in number, having the face of the rock polished perpendicularly, and some pillars formed on its surface, with several figures represented flying in the clouds. The inferior part of the rock consists of a variegated porphyry, sometimes reddish, and frequently of a yellow tint, the

* The leaves of this shrub are employed by the Hindoo women in some religious ceremony, as I found a quantity deposited on the convex stone in the lateral square compartment of the great temple.

† The occurrence of this plant, (a native of the New World), wherever the Portuguese have formed settlements, is a striking instance of the agency of man in the distribution of vegetable species. In addition to the habitat here given, I have observed it at Malabar Point in Bombay Island; on the Island of Coulaba; and at the south end of the town of Macao, in China, in all of which localities it is an abundant plant, affording a parallel case with that of the Chenopodium ambrosioides, (cited by Lyell, vol. ii. p. 83.) which we observe so abundantly in the Island of St. Helena.

basis consisting of clay, and the inclosed particles of altered quartzoze grains, &c.

Remains of painting are still observable, which seems to have originally been of a red colour, but has in some places faded to a purple hue. The upper part of the rock, commencing at the roof of the apartments, is composed of amygdaloid, having a wacké basis, and containing cavities filled with rock-crystal, calcarious spar, zeolites, and many other minerals which a careful examination would readily detect. During the rains these caves are filled with water. The whole face of the hill above these caves is craggy, consisting of amygdaloid, porphyry occasionally appearing, and is covered with thick jungle, and climbers ascending the stems of the numerous trees. Among the former we chiefly remark the Dalbergia scandens, and among the latter, the Getonia floribunda, with its bunches of flowers.

The path, continuing to wind up the declivity, conducts, after passing a fine specimen of the tamarind tree, and of the Asclepias gigantea, to the great temple which faces the north. Like the lower antiquities, it is an excavation in the solid rock, with, however, a much greater extension of human art, for the space included within the walls of the large apartment is a square of 43 yards*, and 18 feet in height, supported by three rows of pillars, consisting of rounded fluted capitals and square shafts. The walls are covered with gigantic figures, all of which have been mutilated, with the exception of the colossal representation of the *Trimurti* fronting the entrance, and one entire masculine form in the recess to the right. The rock is amygdaloid occasionally assuming a purely porphyritic appearance. The effects of the atmosphere upon the more exposed portions of the rock are obvious, for it is evidently decaying and crumbling to powder, and, combined with the ravages produced by visitors, would, in the lapse of time, prevent the probability of any remnant continuing, had not the foresight of the honourable governors of the country obviated the latter cause in some measure, by stationing a resident sergeant to guard these interesting relics. The rock, when first exposed, is highly indurated, and difficult either to fracture or polish, both of which circumstances add greatly to the wonder and admiration with which we must view the temple and sculptures.

In geological investigations, not the least interesting inquiry consists in observations with regard to the degradation of the rocky masses, and the formation of the soils for the growth of the members of the vegetable kingdom. Such questions, it is obvious, can be most satisfactorily solved on insulated lands, where no agencies save the pure natural causes can come into operation. Coral islands, which are of such

* This number is derived from the resident sergeant. I made it forty-six paces.

recent formation, present the most simple illustration upon this point, where we find the calcarious masses splitting under the action of the sun's rays, crumbling and affording a scanty soil for foreign seeds floated by currents to take root, and thus to extend the formation of the soil, by the loosening power of their roots and the fall of their leaves.*

The heat of the sun alone may be considered, therefore, a powerful auxiliary in the production of soils, and this influence is especially applicable to the Indian climate, where the dark hue of the rocks greatly favours the imbibition of heat; an observation similar to that which was made by Link, with regard to the black slates of Pezo,† and subsequently by Humboldt, was demonstrated in reference to the black bare rocks on the banks of the Oroonoko, whose temperatures were found to be elevated during the day 34½° F., and during the night 18° above that of the atmosphere‡. In India, at the termination of the rains in September, the porous stony masses must of course be saturated with moisture, and when the rays of the sun excite their influence, and are imbibed, the water must necessarily be vaporized, and disintegration of the rocky masses ensue. This effect of vapour must be considered as a powerful agent, although not so explosibly effective as the freezing of water:

> ——" cum tristis hyems etiamnum frigore saxa
> Rumperet."§

Because, in one case the confined body has some means of egress, though far from free, while, in the other, the barriers must yield on every side to the overwhelming mass within. When the soil is carefully examined, all the appearances confirm the idea of its derivation from the rocky mass. It has a black colour, which it may in some measure derive from particles of oxide of iron, which are occasionally observable in the porphyry where it has begun to decompose, and from the vegetable matter derived from the trees. No considerable portions of iron have been detected in this neighbourhood, although the oxide of that metal is found in considerable abundance among the ghauts, and is smelted with some profit at the Mahabuleshwur hills||. In consequence of the mixture of vegetable matter with this light rocky production, the soil has been rendered fit for raising some scanty crops, which serve to

* Dr. R. Forster has well described the structure and mode of formation of coral islands, in Cook's Voyage, of whose accuracy the present writer had ample proofs, while examining similar deposits on the coast of Sumatra. A fuller, but not more distinct, account of coral islands is detailed in Beechy's Voyage.

† Link's Travels in Portugal, 8vo. 1801. p. 64.

‡ Humboldt's Pers. Nar. vol. v. pt. i: 26.

§ Virg. G. iv. 136.

|| "Account of the convalescent station of Malcolm Pait on the Mahabuleshwur hills," Bombay, 1830, pamphlet. The chemical nature of the ore is not stated in this publication, but it is probably the magnetic iron ore.

support the inhabitants of the island, who amount to about a hundred. It is a curious fact in the history of this island, that no water can be obtained by sinking wells near the beach, and that the sole supply of the inhabitants is procured at the summit of the hill, where a cool spring exists in a dark cave near the great temple, affording a plentiful supply, from which it is conveyed by the Hindoos to their habitations in porous earthen vessels.

Caranja Island.

This is a large island, situated the most southerly of any in the harbour. It consists of two hills, with an intervening valley. The best landing place is situated on the north-east side of the island, at a fishing village, where, however, the water is very shallow, and where it is necessary, in order to effect a landing, to employ a native canoe. The shore here is bounded by rocks, as at Elephanta, of the amygdaloid species. The shingle consists of bivalve shells (Arca granosa) and waterworn porphyritic gravel. The ascent of the lesser Caranja hill is gradual and easy from the village to the summit of the ridge. The rocks have an inclination to the east and west, as if shelving down on each side of the ridge, presenting the appearance of stratification, or successive deposition, and are covered with low jungle of carissa, ixora, euphorbia, and lawsonia. The descent on the west leads to paddy ground, where there is another village, surrounded with neat gardens, and supplied with a tank, fifteen or twenty feet in depth, dug out of the solid rock, with a wheel and earthern pots to raise the water, as is usual in the east. In this valley there is a fine specimen of the Adansonia digitata, sporting a colossal trunk, and spreading out its branches to overshadow the circumjacent cultivated ground.* To reach the top of the ridge it is necessary to cross several mountain streams, whose beds are dry except during the rainy season. The rocks are all amygdaloid, on the western as on the eastern declivity, filled with zeolites, &c. and are well exposed in the streamlets, sometimes rising in the form of round masses, at other times shelving out and affording a level run for the water, and then terminating in a small perpendicular fall at the edge of the rock.

On the eastern side, in this manner, a very picturesque waterfall is formed, the height of the vertical face of the rock being at least twenty feet, over which the whole water of the torrent is precipitated in one sheet, presenting altogether, with the rich foliage of the tamarind in the foreground, a pretty scene. Near this a specimen of mesolite was

* In this valley I found a specimen of the Agaricus campestris, the identical English ketchup mushroom, of the existence of which plant, in this part of India, at such a slight elevation above the sea, I have never previously heard.

obtained, among innumerable minerals, which may be observed scattered about on the surface of the island, very frequently covered with a blue coating, produced by the presence of iron. Besides mesolite I observed chalcedony, agates, rock-crystal, calcareous spar, and heulandite.

The south-east point of the small hill consists of craggy rocks of porphyry, affording, in their numerous recesses, abundance of hiding places for lizards and serpents, especially the cobra de capello, which is extremely frequent in these islands. The clefts also afford good habitats for the fern Gymnogramma chylomelanos, and the Asparagus sarmentosus.

The large Caranja hill is similar in its conformation to the smaller hill, and is crowned by the ruins of an old fort, which was a place of considerable note, when Europeans first settled on this coast.

At low water the island is connected with the continent, the intervening valley being quite green, and studded with a few pools of water. The vale which separates the two hills, and divides the island into two parts, is covered with palm trees, amid which are situated cottages and rich gardens, at a small elevation above the level of the sea.

General Observations.

In the course of the preceding remarks it appears that, on the continent and along the coasts of the different islands, the soundings do not deepen suddenly, but that the water at the shore is shallow, and that it gradually increases in depth in proportion as we recede from the land. The same remark applies to the whole coast, from the Persian Gulf to Cape Comorin, and it is on a careful attention to the depth of water and the nature of the bottom, that navigators in stormy weather must depend. In the latitude of Bombay this remarkable submarine portion of land which can thus be reached with the lead, attains an additional degree of breadth, jutting out to a greater extent into the Arabian sea, and, from its occupying such a considerable space, and affording good fishing ground, although it can only be considered as an expansion of the shoal water along the coast, it has been termed the Bank of Soundings. The deposit generally obtained in the bottom of the harbour, and on this bank near the coast, consists of a blue clay of a stiff nature, and is, therefore, serviceable by affording good holding ground for anchors. A section, representing the relative situations of the sea and the Bank of Soundings, will explain the subject more clearly than can be expressed by detailed descriptions. The horizontal line (See plate 18), represents the sea level, and the inclined one the bottom of the ocean, which is here shewn to be a gradual descent from the summit of the high land. By sounding regularly, we dis-

cover our distance from the coast, as appears from the following table:—

10 miles from the coast the soundings are 14 fathoms; bottom, mud.				
40	do.	40 fms., sand, gravel, and shells of various colours.		
50	do.	45	do.	do.
160	do.	50	do.	do.
170	do.	55	do.	do.

We observe, therefore, that soundings extend as far to the westward of Bombay as 2° 50′, and that, until the bottom of the ocean begins to ascend, in order to come to the day; the bed consists of sand, mixed with shells, and that then it is formed of mud. An observation with respect to the nature of the shells would be of considerable importance, because it might enable us to decide, whether they are natives of deep water, or belong to the shallower parts of the ocean.

Two explanations occur, to account for the appearances here described: either, 1st. That the land and ocean have retained their positions relative to each other since the formation of the first, the production of the bank being similar to the clay deposit round the shore of the island which so lately appeared, and sunk in the Mediterranean; or 2d., That the harbour of Bombay was formerly a valley, and that the Bank of Soundings was at one time dry ground, both of which have been submersed by the gradual encroachment of the sea. The most undoubted evidence exists to show us that this coast has been, even within the range of a few centuries, subjected to violent convulsions from earthquakes.

In May 1618, six years after the settlement of the English at Surat, "a general and diabolical storm" occurred in the neighbourhood of Bombay (*Bombaim* as it is termed by old writers). It began at Baçaim (Basseen), on the 15th of that month, and continued with such violence that the people hid themselves in cellars, in continual dread lest their dwellings should be levelled with the earth; and at 2 A. M. an earthquake destroyed many houses. The sea, according to the historian of the time, was brought into the city by the wind; the waves roared fearfully; the tops of the churches were blown off, and immense stones were impelled to vast distances; two thousand persons were killed; the fish died in the ponds; and most of the churches, as the tempest advanced, were utterly destroyed. Many vessels were lost in the port. At Bombay, sixty sail of vessels, with their cargoes and some of their crews, foundered.

At Agaçaim, a boat was blown by the force of the wind from the sea into a house, where it killed a woman and her child, and the trees were torn up by their roots.

Besides the presence of a violent commotion in the atmosphere, and the powerful concussion of the earth, volcanic action seems to have occurred, if we may be allowed to deduce such an inference, from the highly embellished representations of the historian, of giants seen in the air throwing great globes of fire at each other, confusions of human voices in the atmosphere, tramplings of horses, and the sound of warlike instruments. It is added that much of this nature occurred in "Salsette" and other places.*

The metaphorical figures expressed in the latter part of the description, are strikingly similar to those employed by Dion Cassius† in his account of the eruption which destroyed Herculaneum and Pompeii, where we are told that giants were seen, and the sounds of trumpets were heard in the vicinity.

Frequent mention of earthquakes may be found in the history of the Malabar coast (which extends from Cananore to Cochin, about 42 leagues), where they go under the denomination of *Bhumiculacam.* In 1784, a strong concussion was felt, and in the province of Nagaracotta, as well as on the bank of the river Sarayuva, volcanic appearances are evident. But the most remarkable changes are to be found in the vicinity of Cochin. On its north side we find the Island Vaypi, which was thrown up by the sea about the year 1341. The soil upon this new formation resembles that of the flat districts of Malabar, which consists of sea sand and calcarious matter, combined with clay said to be washed down from the ghauts. The production of Vaypi gave rise to a new era, termed *Puduvepa* (new introduction). In the same neighbourhood, Bartolomeo informs us, that he was witness to the formation of an island, a mile in length, in the course of ten years before the church at Celtiyatti, by the opposite effects of river and sea water, which may be explained in the following manner: During the months of August and September, if the rains have been abundant, the waters of the river clear away from its mouth, those sandbanks which have been formed during the height of the monsoon, in June and July, by the high sea which then rages in a boisterous manner; but if the rains have been scanty, and the force of the river is not sufficient to carry away the obstruction of its junction with the waters of the ocean, an inundation of the adjacent country ensues; the inhabitants are driven from their dwellings, and so frequent is this occurrence, that we are told grandchildren can scarcely point out, with any certainty, the spot where their grandfathers resided, in consequence of the change in its appearance.

* Sousa's "Portuguese Asia," tom. iii.

† Hist. Rom. lib. 66.

Contemporaneous with the appearance of the Island of Vaypi, the waters which during the rainy season are discharged from the ghauts, broke through the banks of the river Cocci, and overwhelmed a village of the same name with such impetuosity as to sweep it away, and formed in that district a river, a lake, and a harbour so spacious, that very large ships can now lie in security on the north-east side of Cochin, where the river runs into the sea.*

According to the Hindoo records, the ocean has made great inroads upon the opposite shore of India; for, it appears, from the researches, of D. Duante de Meneses, Portuguese governor of India in 1522, among the native writings, that "Miliapore," seven leagues from "Paleacate," the ruins of which were then on the sea shore, was surrounded, according to tradition, 1500 years previous to that date, by 3,300 stately churches, and that the site of that most ancient city was distant twelve leagues from the sea. We are also informed that "St. Thomas dragged out of the sea an immense mass of timber, which all the force of elephants and art of men could not move."†

In the figure which we have given, it is evident that the inclined plain at the land has been comparatively but recently submersed, while the horizontal bed has been for a longer period subjected to the action of the sea, as is evinced by the layer of sand and shells. The whole of this horizontal portion, likewise, we may decidedly conclude, was inundated at the same period, for, after the sea had been raised to the level of forty-five fathoms from the present surface of the ocean, we can see no impediment to its laying the whole plain, extending for at least a hundred miles of longitude, completely under water.

The Hindoos, on the Malabar coast, have a tradition that the sea extended to the foot of the ghauts. There does not appear, however, evidence tending in any degree to prove that such an occurrence has been of recent date; but we are rather disposed to consider the native account, as an indistinct remnant of the almost universal tradition of a deluge during the human era.

The agencies of torrents appear of too trivial a nature, to afford a sufficient source of such an extensive submarine formation, as that which we observe along the Concan and Malabar coasts, although there can be no hesitation in admitting that where considerable rivers do exist, the *debris* collected by the force of their currents must prove a serious obstacle to the encroachments of the ocean. But at Bombay where the bank is much broader than in other parts of the coast, no remarkable accumulations occur at the mouths of the rivers Panwell and Pen,

* Viaggio alle Indie Orientali da F. P. da S. Bartolomeo, Roma, 1796, 8vo. English translation from the German of Dr. R. Forster, 8vo. 1800.

† Sousa's "Portuguese Asia," tom. i. 270.

whose size, indeed, is sufficient to render such an occurrence extremely improbable, even if actual examination did not demonstrate the fact to be as we have stated; and the extensive portion of land in Salsette, which is dry at low water, is situated beyond the influence of any current save that of the tide, which it must be admitted, however, is extremely powerful.

There seems no reason, then, for supposing that this bank has been formed by matter forced down by the agency of running water from the ghauts, as some have concluded, because, it exists where there are no rivers to produce accumulations, and it is broadest at the mouths of the smallest rivers.

In bringing forward proofs of extensive changes and violent convulsions, we have endeavoured to exclude theoretical considerations, and probability is only implied when we observe that the different islands in the bay may have been the continuation of the high land in Salsette and Tull, whose communications have been submersed, and whose basis are now washed by the overwhelming waters of the ocean. *Records of General Science.* April and May 1835.

2.—*Catalogue of Plants collected at Bombay.—By* John Graham, Esq.

We believe this to be the first attempt at communicating any information with regard to the botanical productions of this beautiful part of the western peninsula of Hindostan. The catalogue constitutes the gleanings of a few occasional minutes snatched by our excellent friend (with whom we have spent many a pleasant hour in botanizing amid the sylvan recesses of India) from the ingrossing avocations of his official duties. He has set an example which those who possess more spare time would do well to imitate.—Edit. *Records.*

1. Alpinia *nutans.*—2. Achyranthes *aspera.* A common weed.—3. Asclepias *gigantea.* Very common throughout India. The natives apply the milky acrid juice to sores.—4. Asclepias *acida.* This is a rare plant; I found it last August (1834) on the plains to the south of Aurungabad; also in the neighbourhood of Poona.—5. Asclepias *annulare.*—6. Asclepias *formosissima.* I have only seen this species in gardens, but, I believe, it is a native of India.—7. Asclepias *odoratissima.* This too I have only seen in gardens, and very rare.—8. Amaryllis *Zeylonica.* A very beautiful plant; I do not think it is to be found within this neighbourhood.—9. Asparagus *falcatus.* Large bushes of this shrubby species are common in the Deccan; it requires support and is generally found overtopping some other shrub; it is rather a pretty plant.—10. Aloe *littoralis.* The fibres of its long leaves

are extremely tough and might be used in making cord, if not cloth; however, I am not aware of its being applied to any economical uses.—11. Anacardium *occidentale.* Cashew nut; common in Salsette and on the island of Bombay, &c. The apples are seldom used, indeed they are not worth eating.—12. Adenanthera *pavonia.**—13. Adenanthera *aculeata.*—14. Averhoa *bilimbi.*—15. Averhoa *carambola.* Both species are common in gardens, and the fruit is used for making tarts. The fruit of bilimbi grows from the thick branches and often from the stem of the tree in a singular manner, like the jack fruit. The carambola is called *kurmul* by the natives, a word which signifies sour or sharp tasted. —16. Argemone *Mexicana.* A common weed, if not a native, it is, at least, completely naturalized.—17. Alangium *6-petalum.* Grows on Elephanta.—18. Anona *squamosa.* Custard apple, very common throughout India. The fruit is used as an article of food by the natives in times of scarcity; it is produced in great abundance with the slightest care; the tree seems to grow indifferently on all soils and situations. —19. Anona *reticulata.* Bullock's heart, so named from the shape of the fruit, which is also eaten, though it is inferior to the custard apple. The flowers have a very sweet smell, something like the finest flavoured pears. This species is not nearly so common as the other. It is generally to be found planted near temples along with the other species. They call them *ram vhool* and *ceta vhool,* in honour of a heathen god and goddess; vhool means flower.†—20. Adansonia *digitata.*—This tree appears to be naturalized. Several of them grow on Bombay Island, throughout the Concan and in Guzurat. I do not think any use is made of the fruit; the tree assumes a very fantastic shape, the trunk very short and rapidly tapering; it attains a great size.‡—21. Abrus *precatorius.* A climber common in the edges and jungles; when the pods open and display its red bead like fruit, it looks very pretty. The natives use the seeds for weights, and call them *gooneh.*—22. Artemisia *Indica.*—23. Aristolochia *Indica.* This is a rare plant, with dingy looking flowers and leaves. I found it on Malabar hill and Cross Island in the harbour. Humboldt tells us, the South Americans use the flowers of some of their gigantic species for hats.—24. Artocarpus *incisa.* Bread fruit tree. I only know one tree on the island, it grows well and produces fruit, of some of which I have eaten. In times of scarcity it would be an invaluable tree, and as the soil and climate appear to suit it well, it is a pity that it has not been commonly planted. Its congener the jack fruit (*A. integrifolia*) is in common use among

* This elegant flower (termed the *peacock flower*) forms a prominent part of the *bauquet,* with which the Musselmans present Europeans on Sundays.—Ed.

† The author states in a letter to me that "the properties of Indian plants are little known, and no dependence whatever can be placed on native names. In fact very few have any place in their nomenclature. They are *Jungle ka vhool,* i. e. wild flowers."—Ed.

‡ There is a fine specimen of this tree in Caranja Island. See Records, vol. i., 336.—Ed.

the natives, who call it *plumus*, and the wood of the tree is more used than any other for making household furniture. The tree attains a large size in Malabar; I have seen a single fruit larger than the largest turnip at home. When growing on the stem of the tree it has something the appearance of a hedgehog stuck to it.—25. Amaranthus *tricolor, tristis, oleraceus*, varieties, I suspect; *bajee* is the native name, red, green, and variegated. They are extensively cultivated and eaten like spinage.—26. Arum *campanulatum*. Native name *soorun*. The root somewhat resembles a pine-apple, but it is globular. It is used by the natives instead of yams; I have tasted it; it is rather coarse.—27. Arum *esculentum*. Much cultivated by the natives who make use of the tubers in their curries, &c.—28. Arum *polyphyllum*. Very common, springing up on waste land during the rains.—29. Acalypha *Indica*.—30. Areca *catechu*. A very graceful looking tree extensively cultivated for the nuts (betel) which are chewed by the natives.—31. Andropogon *schoenanthus*. Sweet lemon grass, grown in flower-pots.—32. A. *Ischaemum*.—33. A. *Nardus*.—34. Adiantum *lunulatum*. A fern covering old walls during the rains.—35. Avidcennia *tomentosa*. Very common in salt marshes. I have seen it as large as a middle sized tree; it adorns the banks of creeks and rivers, growing in the water as well as out of it.—36. Acanthus *ilicifolius*. Sea holly. Looks pretty when in flower (dark blue colour); grows common among the Avidcennia plants.—37. Artabotrys *odoratissimus*. I have only seen it in gardens; it is a pretty scandent evergreen plant, with very sweet smelling but insignificant looking flowers, as all the Annonaceae have. Decandolle calls it Unona *uncinata*.—38. Aegiceras *majus* or candel. Found common in salt marshes; it has pretty dark green leaves with white flowers.—39. Argyreia *cuneata* Sprengel. A shrub with very beautiful bluebell looking flowers. When near any support it is scandent and sends out long slender branches. Roxburgh refers it to genus Lettsomia. I have only found it on a range of hills about twenty-four miles west of Poona, near Wurgaum. It is grown as an ornamental shrub in the gardens at Poona, but I have never met with it here.—40. Agave *America*. I have only seen it in gardens at Seroor and Aurungabad.—41. Agrostis *linearis*. A common grass.—42. Anthericum *tuberosum*. Springs up during the rains on rocky waste land.—43. Boerhaavia *diffusa*.—44. Beorhaavia *erecta*. Found about 30 miles N. E. from Poona. Stems woody, as thick as a man's finger.—45. Basella *alba* and *rubra*. Varieties cultivated as root herbs; the leaves are thick and succulent, and afford an excellent substitute for cabbage.—46. Bromelia *ananas*. Pine apple.—47. Bambusa *arundinacea*. Common and well known bamboo.—48. Bryophyllum *calycinum*. Growing in cocoanut groves; rather pretty when in flower; grown in flowerpots as an ornamental plant.

49. Buhinia *speciosa.*
50. „ *candida.*
51. „ *variegata.*
52. „ *parviflora.*
} Trees with pretty flowers particularly the *variegata.*

53. Bergera *Konigii.* Cultivated for its leaves which the natives use in curries. The native doctors use the bark and roots as a stimulant.—54. B. *integerrima.* Found near Panwell on the main land.—55. Bassia *longifolia.* A common tree. The intoxicating spirit called mowra is distilled from the flower. Oil is also expressed from the seeds. It is a very common and useful tree. The oil obtained from the seeds is extensively used for adulterating glue.—56. Bignonia 4-*locularis.* Common in the jungles, and somewhat resembling the ash. The white flowers rising from the ends of the branches look showy at a distance, but cannot bear inspection. 57. Bignonia *spathacea.*—58. Bignonia *radicans.* I have only found these two in gardens; both have pretty flowers, particularly the latter; it is a shrub of very slow growth, and was brought from China, I believe.

59. Barleria *pronilis.*
60. „ *longifolia.*
} Common on waste lands.

61. Barleria *cristata**.—62. Bombax *pentandrum.*—63. Bombax *heptaphyllum.* The first I have only seen in gardens; the latter is a very common tree. Both are deciduous, and the numerous large glowing red flowers of the latter make a very showy appearance when the tree is totally destitute of leaves. February and March are its flowering months. The cotton, I believe, which it produces is of no value.—64. Butea *frondosa.* The immense clusters of red coloured pea flowers which this tree produces, have also a very showy appearance—they come before the leaves,—independent of the flowers, the tree has nothing to recommend it in the way of beauty. It is not very common; several grow in Elephanta.—65. Butea *superba.* A very strong climber, with far more splendid flowers. It grows on Salsette—rare.—66. Bryonia *grandis.*—67. Bryonia *scabra.*—68. Borassus *flabelliformis.* Tall palmyra tree; common.—69. Borago *Indica.* A very common annual springing up in the rains.—70. Bignonia *Rheedii.* I have only seen one tree. The flowers grow on a scape five or six feet long, and give the tree a curious appearance at a distance.—71. Canna *Indica.*—72. Costuss *peciosus.* Found it on a hill near Wuzaum Poona road.—73. Curcuma *montana.* Very common on the top of the ghauts. A species of arrow-root is made from it.—74. Cissus *vitiginea.*—75. Cissus *carnosa.*—76. Cissus 4-*angularis.*—77. Cissus *ripanda.*—78. Cissus *crenata.*—79. Convolvulus *speciosus.* Elephant creeper.—80. Convolvulus *batatas.* Extensively cultivated.—

* I have picked specimens of this plant in Dane's Island, Whampoa, China. A very good figure of it is given in Osbeck's voyage to China—a work which those who write on the botany of that country should not fail to consult.—Edit.

81. Convolvulus *turpithum.*—82. Convolvulus *grandiflorus.*—83. Convolvulus *paniculatus.*–84. Convolvulus *pes-caprae.**–85. Convolvulus *tigridis.*—86. Convolvulus *muricatus.* There are several other species of convolvulus common, but I have not been able to identify them.—87. Coffea *Arabica.* In gardens only.—88. Capsicum *annuum.* Commonly cultivated in gardens.—89. Capsicum *frutescens.* Ditto.—90. Cocculus *cordifolius.* —91. Cicer *arietinum.* Extensively cultivated in the Deccan and Guzurat. The grain plant. Horses are fed with it instead of corn.—92. Celosia *margaritacea.* An annual, springing up every where in the rains.—93. Carissa *carandas.* Curwund of the natives; a very common shrub strongly armed, and producing black berries about the size of a sloe, which are eaten raw, or made into jellies, &c.—94. C. *spinarum.* Berries red. This species I have only seen in gardens.—95. Cerbera *thevetia.* Only in gardens.—96. Ceropegia *tuberosa.* Very rare, I have only once seen it on Malabar hill.—97. Crinum *asiaticum.*—98. Cardiospermum *halicacabum.*—99. Cassytha *filiformis.* Common in jungles.—100. Cassia *fistula.* Elephanta and Salsette.—101. Cassia *Sumatrana.* In gardens only.—102. Cassia *auriculata.* Very common in the sterile parts of Deccan.—103. Cochlospermum *gossypium.*—104. Cochlospermum *serratifolium.* In gardens.—105. Coreopsis *tinctoria.* Grown in pots, &c., as an ornamental plant.—106. Crataeva *religiosa.* Commonly to be found in the neighbourhood of temples.—107. Cactus *ficus indica.*—108. Calyptranthus *caryophyllata.* Native name jamb; the fruit is eaten—109. Capparis *Zeylonica.*—110. Capparis *trifoliad,* or *Crataeva religiosa.*—111. Capparis *sepiaria.*—112. Capparis *acuminata.*—113. Calophyllum *Inophyllum.* A very pretty tree, common in the Concan and Malabar. Oil is expressed from the seeds and used for lamps by the poorer classes of natives.—114. Corchorus *acutangulus.* Annual; common in the rains.—115. Clerodendrum *Siphonanthus.* In gardens only.—116. Clerodendrum *infortunatum.*†—117. Clerodendrum *fragrans* in gardens.—118. Cleome *5-phylla.*—119. Cleome *viscosa.*—120. Crotularia *verrucosa.*—121. Clitorea *ternalea.*—122. Citrus *Decumana.* Pummalo or shaddock, commonly cultivated.—123. Citrus *Aurantium.* —124. Citrus *Limetta.*—125. Cacalia *sonchifolia.*‡–126. Chrysanthemum *Indicum.*—127. Cadsuarina *muricata.* Common in Bombay, where it is planted for ornament. It shoots up very rapidly.—128. Coix *Lachryma.*—129. Cicca *disticha.* Fruit sometimes used for tarts.—130.

* This fine creeper occurs abundantly on the shore by the race course of Macao in China, occupying the place of the C. *Soldanella* of the Scottish coast.—EDIT.

† This plant occurs in Dane's I. China.—EDIT.

‡ This plant is also a native of China. I have found it abundantly on a rocky point W. of Dane's Island village, Whampoa, and also on the opposite side of the river Tigris. The correspondence of the Flora of Malabar and China is very striking, but the present catalogue shews that the same observation does not apply to the Concan coast.—EDIT.

Cocos nucifera.—131. Caryota *urens.* This beautiful palm grows plentifully on the ghauts.—132. Croton *variegatum.* This has obtained the name of laurel, and is very commonly grown in pots. The temporary bungalows on the esplanade are surrounded with it to keep out the glare of the sun. The C. Tiglium grows in Guzurat. I have never seen it.—133. Cynanchum *extensum.* A common twining plant.—134. Cucurbita *Citrullus.*—135. Cucurbita *hispida.*—136. Cucurbita *lagenaria.* The melon and cucumber family are very generally cultivated, and form a common article of food with the natives.—137. Cucumis *sativus.*—138. Cucumis *Colocynthis.* In the Deccan.—139. Cucumis *Melo.*—140. Cucumis *acutangulus.*—141. Cucumis *Citrullus.*—142. Cucumis *Maderaspatanus.*—143. Cylista *scariosa.* Scarce —144. Cannabis *sativa.* An intoxicating liquor called bhang is prepared from it.—145. Cycas *circinalis.*—146. Carica *Papaya.* Generally cultivated.—147. Cassandra *undulæfolia.*—148. Carthamus *tenebrans.*—149. Caesulia *axillaris.*—150. Combretum *decandrum.*—151. Conyza *cinerea.*—152. Cordia *Myxa.* A tree much resembling the alder. Fruit sometimes pickled.—153. Cordia *angustifolia.*—154. Coronilla *grandiflora.* Natives commonly plant this tree about their houses. It has large showy flowers and is of very quick growth.—155. Ceanothus *Zeylonica.* Elephanta.—156. Celtis *orientalis.*—157. Caesalpinia *pulcherrima.*—158. Capparis *aphylla.* Common in the barren lands of Deccan.—159. Careya *arborea.* I have seen only one tree on Malabar hill. 160. Casearia *elliptica.*—161. Chloris *barbata.*—162. Cyperus *rotundus.* —163. Cynosurus *indicus.*—164. Callicarpa *lanata.*—165. Celastrus *montana.*—166. Cynometra *cauliflora.* In gardens scarce.—167. Cookia *punctata.*—168. Cyperus *dubius.*—169. Cyperus *compressus.*—170. Commelina *communis.*—171. Cleome *icosandra.*—172. Cissampelos *convolvulacea.*—*Records of General Science,* July and August 1836.

The PRESIDENT AND COUNCIL OF THE ROYAL COLLEGE OF SURGEONS IN LONDON, have recently presented to the Madras Medical Society several quarto volumes of an *Illustrated* and *Descriptive Catalogue* of the contents of their noble Museum, which, it is well known, was enriched by the unrivalled collection of the immortal JOHN HUNTER.

These volumes in themselves form a most valuable work on Anatomy (human and comparative), Physiology and Pathology, and the cause of those sciences cannot but be advanced by their publication, for which the Council of the College deserves the highest praise. The Engravings are beautiful specimens of art, and highly interesting as illustrative of the most important objects in this magnificent and unique collection.

Cultivators and admirers of Science cannot but esteem it a high privilege to be enabled to contribute to the treasures of the Museum, thereby adding to the splendid fabric raised by the genius of the immortal HUNTER; to be associated with whom, in however trifling a degree, in the cause of humanity and science, is an honour and a delight well worthy of the trifling pains and trouble called for on this occasion. As a great number of the medical readers of this Journal boast of the London College as their *Alma Mater*, they possess another motive to induce them to attend to the call made in the following extract from a small volume which accompanied the *Descriptive and Illustrated Catalogue*, in which some admirable directions are given for preserving objects of Natural History; and a list of animals, procurable in the various regions of the globe, is appended, specimens of which are desired to complete the collection—of these we have given here only those found in Asia. The Editor of this Journal will be very happy to receive and forward to the College any contributions that may be sent to him for that purpose.—*Editor Madras Journal.*

3.—DIRECTIONS *for* COLLECTING *and* PRESERVING ANIMALS; *addressed by the* BOARD *of* CURATORS *of the* MUSEUM *of the* ROYAL COLLEGE *of* SURGEONS *in* LONDON *to Professional, Scientific, and other Individuals, with an invitation for Contributions to the Museum of Animal and Vegetable productions, Fossil remains, Anatomical preparations, Casts, Models, Paintings, Drawings, or Engravings, which may conduce to the illustration of the Animal Œconomy in its healthy and morbid conditions.*

ROYAL COLLEGE OF SURGEONS IN LONDON. The Council being desirous not only to maintain and preserve the Hunterian Collection, but also by suitable additions to make it as conducive as possible to the illustration of the structure and physiology of organized beings, and to the advancement of Surgery and the Art of Healing generally, solicit contributions to the Museum from Professional, Scientific, and other individuals, of such Preparations, Casts, Models, Paintings, Drawings, Engravings, and Chirurgical Instruments as may promote these objects.

The following DIRECTIONS, principally drawn up by JOHN HUNTER, are proferred to facilitate the endeavours of those friends to Science who may be inclined to further the designs of the Council, and who may not be familiar with the art of preparing and preserving animal substances for anatomical purposes.

Of the methods of catching and preserving animals.—All animals are naturally wild, and in many instances it requires considerable art to catch them. The more perfect animals, which have much progressive motion, require to be taken by means which generally produce some degree of injury to their different parts, and often to their external form; this injury will be in proportion to the difficulty and mode of capture.

Quadrupeds are in general either caught in traps or shot, and consequently some parts of the body are injured; but this is unavoidable. Birds are usually shot, to the injury of their plumage and often of their internal structure.

Snakes, Lizards, and indeed Reptiles in general, are commonly caught without being previously wounded, and therefore suffer less in their external form than birds; but even these may be considerably damaged if care be not taken, for as they are generally caught in the breeding-season, it is very possible that the organs of generation, and the parts contained in them, as eggs, &c., may be crushed; it is therefore proper to seize them by the neck, and immediately to immerse them in spirit, so as to drown them, or to keep them in a bag until spirit* can be procured.

Turtles, Crocodiles, Fishes, Crustaceans, and Insects are liable to little or no injury to their form or structure from the mode of capture.

The softer animals, most of which inhabit the sea, suffer very little from the manner of catching them; but as their shape and size admit of considerable variation, their form may be much altered from the manner in which they die. Animals without internal hard parts to determine their shape or locomotion, yet having a considerable quantity of muscular contraction, vary their shape according to circumstances; of this kind are the Sea Anemones (*Actiniæ*), Priapi or *Holothuriæ*, Shell-fish, Slugs, Medusæ, &c.: these should be allowed to die gradually in the water they are accustomed to; by which means they die in a relaxed state, and display more of their natural external form: but it is desirable to have specimens in the different degrees of expansion or contraction. When dead they are immediately to be put into spirit, for fear of putrefaction, which otherwise rapidly takes place.

A sketch or drawing of Molluscous or other animals of which the form and colour are materially altered by death or when put into spirit, will greatly assist in rendering a description more intelligible. The admeasurements, also, of an animal where parts only are preserved, are very necessary; and the sex should be noted where it is not obvious from the parts preserved.

* Colourless alcoholic spirit rather above proof is the most fit.

Animals, of whatever class, which are small enough to be preserved whole, should be kept in that state.

Those which are too large to be transmitted entire in spirit, should be divided into such parts as characterize them. When this division into parts is requisite, it will be necessary previously to take notice of all the external appearances, the number of nipples in the female, and their situation, whether between the anterior extremities, as in the Monkey tribe, Bats, Elephant, Dugong, &c.; or all along the belly, as in the Sow, Bitch, Rat, &c.; or between the hind legs, as in the Mare, Cow, &c. If the female cannot be procured, then examine the nipples of the male; and indeed it is proper to examine every male, for it sometimes happens that these parts are concealed, as in the Horse. It is hardly necessary to describe the external parts of the female, as, generally, the whole of them may be preserved.

The situation and external appearances of the penis in its natural state must be observed, whether it extends along the abdomen, as in the Dog; or point backwards, as in the Cat, Rat, Rabbit, &c.; whether covered by the common skin, as in the Bull, Deer, Bear; or by a proper skin, and only attached to the belly at the upper side, as in a Dog, Horse, &c. And any other external appearance which cannot be preserved, or where the parts are too large to be kept whole, should be particularly noticed and described.

When the examination has proceeded thus far, the dissection is to be begun, by opening the abdomen, &c., to see what internal parts are worthy of preservation.

When the animal is opened for this purpose, it will be proper to take a general view of the viscera in their natural situation; to ascertain the number of lobes of the liver, whether there be a gall-bladder, &c., the situation and form of the stomach, spleen, cæcum, kidneys, &c., also to make such observations upon them as may be thought necessary; after which the parts may be separated and severally distinguished by appropriate labels.

Animals whose food is not exactly known should have the contents of the stomach and intestines examined, to ascertain, if possible, what food they had last taken: the kind of fæces contained in the colon and rectum should also be noted.

The stomach and alimentary canal of Fishes, and other marine animals merit particular examination, as frequently containing not only animals and parts of animals which inhabit great depths, and other situations equally beyond the reach of ordinary observation, but also singularly formed intestinal worms.

Memoranda should be made of the localities from which specimens have been obtained; whether at sea or on land; the period of the year when taken, as material to determine the breeding season, &c.; the vernacular names, and the meaning thereof, if any, in the language of the country. If there be no name for a specimen, a number should be attached to it, corresponding with that of the description or memorandum respecting it. A wooden tally or label should be attached to each specimen, where several are put into the same bottle; as tallies of sheet lead, parchment, leather, &c. are liable to be defaced or obliterated.

Such tallies are preferable also for dried specimens, as those written with ink are liable to be defaced by moisture or insects during the voyage.

The bottles being numbered, little trouble will be required to keep an account of their contents, which will add greatly to their value. If this be neglected, much confusion and uncertainty may ensue.

A description should be taken of form, colour, &c. while the animal is alive, or immediately after death, before it be put into spirit; which frequently produces a collapse or contraction of parts, and changes or destroys the colours, particularly those which are delicate or evanescent.

Of Quadrupeds.—The head should be preserved on account of the teeth; but if too large for a cask or bottle, that part in which the teeth are placed may be cut off; but this will seldom be necessary.

The feet and tail may be kept attached to the skin and dried; or if the skin is not preserved, the feet and tail only, either dried or in spirit.

The œsophagus and stomach should be preserved in spirit, with a portion of the duodenum, and the cæcum, if any, with a small portion of the ileum and colon. If the animal be not too large, it will be preferable to cut off from the mesentery the jejunum and ileum, which (after their length and circumference, and the nature of their contents have been ascertained), may be thrown away, and then to strip down from the spine the contents of the abdomen, beginning at the diaphragm, so as to have the liver, stomach, spleen, pancreas, colon, &c., all with their attachments, taken out together as low as the rectum, where it lies in the pelvis, and, after being cleansed and the contents examined, put into spirits.

The heart and lungs may be preserved together, or, if too large, the heart alone with the large blood vessels.

The contents of the pelvis, viz., the bladder and rectum, with the internal parts of generation both male and female; also the external parts not separated from the internal, with a large portion of the sur-

rounding skin, should be left attached in their natural state, and preserved in spirit.

If the female parts are in a state of impregnation, the whole are to be taken out as before described, without opening the uterus unless for the purpose of admitting the spirit for the preservation of its contents, where of large size.

The young of very large animals, as Whales, Seals, the Walrus, Elephants, &c., and all abortions, should be preserved entire: but if a young cetaceous animal be too large, the tail may be cut off below the anus, and the body put into spirit; and if this should be too big for one cask, the head may be taken off and preserved in another.

Of a full-grown whale or other large animal the following parts should be preserved.

The eyes, with the surrounding external skin, their muscles and fat, in an entire mass. The organs of hearing. The brain. Sections of the spinal chord. The supra-renal glands. The ganglions of the sympathetic nerve. The beginning of the aorta and pulmonary artery, for the valves.

The mammæ of the female, with part of the surrounding skin; also the ovaria and uterus. The fœtus, when found in the belly, to be taken out with the whole of the uterus, vagina, ovaria, &c.

The penis of the male taken off as far back as to include the anus with it.

The bones of animals are to be preserved; and, if possible, those of full-grown specimens, both male and female, distinguishing each.

The flesh should be stript off, and the bones either boiled, or put into a cask with water, and securely headed in, if the time and circumstances will not allow of maceration.

To preserve the bones of an animal for a skeleton, it is desirable that as much of the flesh should be removed as possible while quite fresh, without cutting or defacing the surface of the bones; and, if opportunity allows, it is advisable to soak them for several hours in water, frequently changed, to separate the blood; and the brain may be broken down and extracted by means of a small flattened stick, otherwise the skull will be discoloured.

The bones should be allowed to remain connected as much as possible, and, when dried in a tolerably straight position: they may be packed in saw-dust, or shavings of deal, or any other white wood, which will not cause discolouration.

Besides an entire set of bones, it is desirable that a skull or two, shewing the teeth in various stages of growth, be preserved. The teeth to be as perfect as possible, and if any becomes loose or fall out, they may be fixed in their sockets with strong gum-water or glue,

but never with paint or putty; or the loose teeth may be tied up in a piece of linen, and securely attached to the skull.

Delicate specimens of skulls, or sets of bones, should be inclosed in small separate boxes, to prevent their being crushed by larger specimens, and many may then be packed in one large case.

All the parts of one Quadruped should be kept together, and separate from those of another.

Of Birds.—Some birds are too large to be preserved entire; therefore it becomes necessary to observe and describe or delineate their external appearances before the parts are separated.

Birds have few internal parts which are necessary to be preserved. The heart and kidneys are nearly the same, I believe, in all birds.

The liver, stomach, intestines, ovary, oviduct, &c., may all be taken out as low as the anus, and preserved in spirit.

The bills and tracheæ, with the lower larynx, should be preserved in spirit by themselves; and when many specimens of a rare or curious bird are procured, the heads of a few of them should be taken off and preserved in spirit.

The legs and feet should be preserved, but they may be dried.

Of Reptiles.—When Alligators, Crocodiles, Turtles, or Tortoises are too large to be preserved whole, some parts, as the head, the whole viscera stripped down from the neck to the anus, and also the anus, should be put into spirit. The bones of such specimens are especially desirable. The eggs at different stages of development should be preserved in spirit, as also the young animals.

Lizards are to be preserved whole.

Snakes may be preserved whole, or in part, especially the heads, both of the poisonous and innocuous species, for the examination of their teeth and fangs.

Of Fishes.—In a fish the external appearances should be attended to, its length, depth and thickness, the number of fins, their shape, where placed, the number of hard and soft rays supporting the fins, &c.

In very large specimens of the Shark or Ray kind, &c., the abdomen should be first opened, then the head taken off by dividing the fish below the heart, across the upper part of the liver, by which means the mouths of the oviducts, if it be a female, the heart, and head are all preserved together.

The tail, if a thick one, as that of a Shark, may be taken off a little below the anus, and the trunk alone preserved for examination. If the trunk be too large, it should be cut through above the pelvis, and the

parts contained in the hinder portion, as the claspers of the male, should be preserved in spirit.

If a female, separate the two oviducts through their whole length, where they run along the abdomen, on each side of the spine; but keep them attached to the pelvis in front, and preserve the whole.

If with young, or eggs, take the whole out in the same way, without opening the oviducts.

The peculiarities of the fœtus in these animals should be attended to.

If not of the Ray or Shark kind, take out such parts from the abdomen as are uncommon or singular.

If fish of the roe-kind, (i. e. Osseous and Cyclo-stomous Fishes), then cut transversely through the fish near the lower part of the roe, some way above the anus. This saves part of the roe, with the connexion between it and the anus, the principal parts concerned in generation.

The tail may be cut off some inches below the anus.

The stomach and intestines may be saved, if any thing particular is observed in them.

Eyes of fishes are proper objects of preservation.

Separate and preserve the heads of such fishes as have any thing singular about the teeth or gills, and are too large to be preserved entire.

If there should be small ones of the same kind, they are to be kept whole; but still preserve such parts of the large specimens as are curious.

Of Crustaceans and Insects.—Lobsters, Crabs, Beetles, Flies, Butterflies, &c., may be dried, because their external covering is their hardest part, and alters little by shrinking. This is to be done when the external form only is required for examination.

In preparing them for drying, great care is to be taken to preserve all their external parts as perfect and as expressive of the natural progressive action as possible.

Crabs, Lobsters, and Crawfish, when dried, should be wrapt in very soft paper, and then packed in cotton so as not to allow of their being displaced in the case, nor to touch one another.

Insects should be pinned down upon a board or piece of cork, or upon wax which has been melted and poured along the bottom of a flat box: the pin should be greased or oiled, to prevent rust, which would render it difficult to take off the insect. If the pins were pointed at both ends, they would the more readily admit of being turned. The pin must be made so fast in either of these substances as to allow of the motion of the box in all directions, and the fastening must be in proportion to the weight of the animal. To preserve them for anatomical examination they should be put into bottles with spirit.

Lobsters, Crawfish, Crabs, Beetles, may be put into a bottle all together; or if each order be kept separate, yet several specimens may be kept together.

Butterflies, Moths, Bees, should be kept by themselves; for if put into the same bottle with the above, they would be injured.

Of Eggs.—To preserve the eggs of Birds with their nests, each nest should be put into a round box just large enough to contain it. After having made a small perforation at each end of the eggs, and expelled their contents, some cotton should be laid upon them to keep them from being moved about, and the whole covered with the lid.

Large eggs, as those of the Ostritch and Cassowary, at different periods of incubation, should be preserved in spirit.

The eggs of Turtles, Lizards, Crocodiles, Snakes, &c., should be collected, and similarly preserved at different periods after being deposited, until the fœtus be excluded.

A perforation should be made at each end of the egg, by which the spirit will have access to the inside, and the contents be more effectually preserved.

The eggs of all sorts of insects should be preserved in spirit for the same purpose.

Various observations on the means of preserving Animals.

An animal of the firmest kind, in a temperate climate, will generally require a quantity of proof spirit nearly equal to its own weight, to preserve it from putrefaction.

Animals of the mixed kind, neither hard nor soft, such as many of the soft fishes, require rather more spirit than their own weight.

Soft or watery animals, such as many molluscous and other sea animals, require rectified spirit, and nearly the same quantity as the above. But these are relative circumstances, which will vary according to the climate, and the state of the animal at the time. If the climate be very hot, and the animals are to be kept in that climate for some time, or if the parts are not very fresh, more spirit will be required.

This proportion of spirit should be particularly attended to when parts are large; for a very small animal or part will generally have more spirit added to it than what is here directed, while a large animal or part obtains less.

Animals which I call firm are those of the Quadruped kind, as rats, mice, &c.; and indeed snakes, lizards, and all insects (as far as respects the quantity of spirit) may be considered in the same class.

In the mixed kind I would include most sorts of fish; however, there are many fish that may be included with the first.

Of the watery or pulpy kind, I reckon Sepiæ, Medusæ, Echini, Starfish, and likewise all those that appear to be gelatinous, for their internal structure is extremely tender.

If the animal is small, as a rat or mouse, it may be preserved by immersing it in its own weight of spirit; but if some spirit is thrown into the abdomen, so much the better.

If it is a large animal, as a dog,* it ought to have the thorax and abdomen filled with spirit; for before the spirit can penetrate through the cutis, the internal parts will become putrid.

A trochar and syringe will answer for filling both these cavities.

Large fish should be preserved in the same way.

In very soft animals the spirit will generally penetrate sufficiently fast to preserve the whole.

Animals preserved for their external figure should be suspended nearly in the attitudes in which they are designed to be kept.

Animals which are preserved merely for dissection, may be put into a bottle or cask without suspension, and even more than one or two in the same vessel, paying strict attention to the strength and proportion of the spirit.

If two are put into a cask at once, they should be kept apart for some time, as they make too large a mass when close together for the spirit to penetrate.

More than one or two may be put into the same vessel when they are suspended, because then they are not allowed to press on one another.

According to our proportion of animal and spirit, a vessel may be half filled with them.

Birds are seldom so large but that they may be kept in spirit, so as to preserve external appearances; therefore they should all be suspended with some care. Many may be put into one vessel, but must not be squeezed upon one another; and the mouth of the vessel should be wide enough to let them pass both with and against the direction of the feathers.

If the bird was put into a proper position, the feathers made smooth, and rolled up with a fine linen roller, it might still better preserve their external form.

If a pipe was put into the mouth, and spirit thrown down the windpipe, it would pass through almost the whole body by means of the air-cells; and it would therefore be unnecessary to inject any by the anus or abdomen.

Animals of the Lobster or Crab kind may be put into a vessel without suspension, and they should be wrapped up in linen, if preserved in this way, for external form. They should be nearly of the same size, as the larger will break the legs of the smaller if put all together.

Animals of the soft or pulpy kind should be kept apart from others which are hard, more especially if preserved for their external form, and should not be crowded. If possible, they ought to be suspended;

* I call them large animals, because much larger can seldom be brought home whole.

but many of them are not firm enough to be capable of supporting their own weight upon threads; these should be put into separate bottles.

Shell-fish may be put into the vessels in any manner, as the shell preserves them from pressure; but if they died projecting out of the shell, they should be suspended in the spirit.

If of the spiral kind, a small piece of the shell should be broken off at the tip, to allow the spirit to enter the posterior parts; for the body of the animal fills up the whole mouth of the shell, and the other end becomes putrid before the spirit can get to it.

Snakes should have some spirit injected by the mouth and anus, as I find they are apt to become a little putrid about the belly, and lose the cuticle at that part; then they should be coiled up in close spiral turns round the inside of a small vessel.

Lizards might be suspended by the tails in long bottles.

In some that are very long, the tail may be bent upon the body, or rolled in spiral turns on the inside of the vessel.

The Echinus, with the spines, should be wrapped up in cotton, and either put into a wide-mouthed bottle, or, for greater security, into a round box, with holes in it, so that it can neither touch nor press upon the sides, and the box immersed in spirit.

If the animals are suspended in barrels, cords should be run across the mouth, to which they may be suspended, and then the tops put in, and the spirit added afterwards.

The barrels should in general be tolerably deep.

Of changing the Spirit.—Animals, or parts, that are put into spirit, should have it changed at the expiration of a fortnight; as the first spirit which penetrates the substance of the part to be preserved, will be considerably lowered and discoloured by the fluids of the animal: perhaps it will not be necessary to change the spirit oftener than once; for by the time above mentioned the first spirit will have united sufficiently with the part, and have checked putrefaction, as far as such diluted spirit can, but will not be sufficiently strong to continue the preservation of the part; however, the time will vary according to circumstances. If in a hot climate, the spirit may require changing sooner; if in a cold one, later; if the part be soft or gelatinous, the spirit will also require being changed sooner; and if a hard, or firm part, it may be later.

Another advantage arising from spirit sufficiently strong is its own preservation; for when much diluted and joined with the animal juices, it changes from spirit to vinegar, the effect of which is, that the bones of the animal, or parts, are softened so as to be unfit for a skeleton.

If spirit cannot readily be procured, strong brine will in most cases answer the purpose.

A List of ANIMALS *desirable towards completing the series of* COMPARATIVE ANATOMY *in the museum of the* ROYAL COLLEGE *of* SURGEONS *in* LONDON.

The names printed in small capitals are of those Animals which are more especially required.

The names marked with an asterisk (*) indicate those animals of which the bones only need be transmitted. Of these it is highly desirable to procure Skeletons both of the male and female, with separate skulls of both sexes, for the teeth, sexual differences, &c., and skulls of the young animal for the deciduous teeth, and the changes of form resulting from growth.

Skeletons and skulls of the different varieties of the human species are objects of particular interest for the Museum. The names of the Tribes, and the localities to which they belonged, should be transmitted with the specimens.

ASIA.—BOMBAY.—*Monkeys of all kinds.—*Deer.—MANELESS LION. Skeleton and skull of male and female.—*Birds.*—Cambay Flamingo.—FLORICAN BUSTARD.—*Reptiles, Fishes,* and *Marine Invertebrata* generally.

CEYLON.—*Mammals.* ELEPHANT. Skeleton; skulls of a full-grown male and female. Brain and sections of spinal chord of an adult· Impregnated uterus, and natural skeleton of the young Elephant soon after birth. Mammary gland of a suckling female. Sections of the recent skull, containing the organ of hearing in spirit. Jaws of the young animal, in brine, for the pulps of the growing teeth.—SLOW LEMUR, especially impregnated uterus.—SLENDER LEMUR.—Musk-deer, or Small Deer, the stomachs distended, in spirit; skeletons and skulls. *Birds.*—Skeletons and Sternums, of all the indegenous Birds.—*Reptiles.* Alligators.—The SNAKE-LIZARD.—A large reptile frequenting the great rivers.—The Python, or Boa; the impregnated oviducts.—*Fishes.* All freshwater species.—*Mollusks.* Cuttle-fishes; the Pearl Oyster and the Pearly Nautilus, in spirits. Marine Invertebrata generally. Specimens of the SEA-MANTIS (*Squilla*) in spirit, with its ova and young.

MADRAS AND CALCUTTA.—*Mammals.* Asiatic Lion. Skulls of both exes, and skeleton.—ARCTONYX, or Sand Hog.—PANGOLIN, or MANIS; especially impregnated uterus.—ONE-HORNED RHINOCEROS (same parts as are desirable from the Elephant).—PANDA, or CHITWA.—* CHIRU ANTELOPE.—CHICKARA, or 4-horned Antelope,—*The Sloth-Bear.—*Isabella Bear of Nepaul. (The impregnated uterus of any species of Bear

is very desirable). Bandicoot Rats.—FLYING SQUIRRELS.—Musk Deer of Thibet. *Squirrels.—Musk-rat, or Musk-shrew. SOUSOUS, or GANGETIC LONG-NOSED PORPESSE, (*Delphinus Gangeticus*). Fossil bones of the *Mastodon*, &c. from the banks of the Irawaddi.—*Birds*. Adjutant. Eggs at different stages of incubation, in spirit. Natural skeletons of young.—Cyrus Crane.—Stanley Crane, or Demoiselle.—Jungle-fowl.—BUSTARDS.—Vultures.—Ducks and Teal. *Reptiles*. Gangetic Crocodile, or GAVIAL. Skeletons of full-sized specimens. Eggs in spirit.—Alligator. Ditto ditto.—Cobra de Capello. Impregnated oviducts in spirit.—*Fishes* and *Mollusks* in general; especially the Cuttle-fishes of all kinds. *Nautili* and *Argonautæ* in spirits.

SUMATRA, JAVA, BORNEO, &c.—ORANG-UTAN. Skulls of this species at different stages of growth, especially the skulls and skeleton of the full-grown or great Orang. Also the viscera of the same; and more particularly the impregnated uterus.—Long-armed Apes, UNGKA APE, &c., the same parts.—INDIAN TAPIR, same parts as from the Elephant.—Civets and Genets.—SUMATRAN RHINOCEROS. Skeletons and skull of both sexes; impregnated uterus. Natural skeleton of the young animal.—*BABYROUSSA.—FLYING SQUIRRELS.—PANDA.—BENTURONG.—MYDAUS or Skunk.—TUPAIA.—GYMNURA, or Rat-tailed Weasel.—DELUNDUNG (*Prionodon*). *Rimaudayan Tiger.—PANGOLIN, or Manis.—TARSIER.—FLYING MACAUCO (*Galeopithecus*).—FLYING FOX (*Pteropus*)—Opossums.—DUGONG. Especially the skulls of an ascertained male and female; impregnated uterus.—*Birds*. CASSOWARY. Skeleton of male and female, natural skeleton of young. Eggs, with embryo, in spirit. Newly hatched young, in spirit.—Horn-bills (*Buceros*); especially the HELMET HORNBILL.—Crown Pigeon.—*TWO-SPURRED PEACOCK.—Java Swallow, and specimens of the edible nests, with the eggs.—*Reptiles*. Alligators, Skeletons of, and eggs.—Pythons, or Boas. Skeletons and impregnated oviducts.—Water-snakes. *Fishes*, especially freshwater species.—*Mollusks* Cuttle-fishes. Pearly Nautilus, in spirit. Paper Nautilus, ditto. The *Teredo giganteus* seu *palmulatus*. Mollucca Crab, in spirit. Marine Invertebrata generally.

4.—*Instructions for Making and Registering Meteorological Observations at various Stations in Southern Africa and other Countries in the South Seas, as also at Sea.**

The great importance of possessing an exact and carefully registered account of the variations of the barometer, thermometer, and other meteorological instruments, and of the winds and weather throughout that extensive region of the Southern Hemisphere, which is either included within the boundaries of this colony, or readily accessible from it, has determined the South African Literary and Philosophical Institution to request the assistance of its correspondents, and of all who may have leisure and inclination for observations of the kind, towards the gradual accumulation of a continued and extensive series of meteorological Journals, and towards carrying into effect a concerted plan of contemporaneous observations, on stated days, from which it is conceived that much advantage will be derived. The institution therefore solicits the attention of its correspondents, and of the lovers of knowledge generally, to this object; and earnestly requests their co-operation in making, arranging, and forwarding to its secretary, resident in Cape Town, observations of the nature; and, so far as practicable, according to the plan of those hereafter detailed. Such observations alone can furnish the materials necessary for an accurate and scientific inquiry into the laws of *climate*, regarded as an object of local interest, and are the only data through which (taken in conjunction with the known laws of physics), the more general relations of meteorology can be successfully investigated.

It can scarcely be necessary to insist on the practical importance of this science to the agriculturist, to the navigator, and indeed in every branch of human affairs, or to dilate on the benefits which must accrue to mankind in general, from any successful attempts to subject to reasonable and well-grounded prediction the irregular and seemingly capricious course of the seasons and the winds; or on the advantages, purely scientific, which must arise from a systematic development of laws exemplified on the great scale in the periodical changes of the atmosphere, depending, as they do, on the agency of all the most influ-

* These instructions are understood to have been drawn up by Sir John Herschel, for the Meteorological Committee of the South African Literary and Philosophical Institution; and have been very generally re-printed in Scientific Journals in all parts of the world; and their excellence merits the distinction.

In a letter with which we have been favoured from Sir John Herschel, that distinguished philosopher writes: "The hourly meteorological observations at the solstices and equinoxes, of which you have no doubt seen accounts, continue to be made here, and at a very great number of other stations in every quarter of the globe—a series from Madras would be most highly appreciated."

It will be observed that this suggestion has been anticipated; and we hope to have a series of these observations from our excellent and indefatigable Astronomer, for as long a period as may be required.—Editor Madras Journal.

ential elements, and embracing in their scope every branch of physical science. It is more to the present purpose to observe that, from what has already been done in this department of human knowledge, there is every reason to hope that no very distant period may put us in possession of the key to many of the most intricate meteorological phenomena, and enable us, though not to predict with certainty the state of the weather at any given time and place, yet at least to form something like a probable conjecture as to what will be the general course of the next ensuing season—perhaps to prepare us beforehand for violent and long-continued gales of wind, great droughts, or extraordinarily wet seasons, &c. in the same manner that our knowledge of the nature and laws of the tides, although confessedly imperfect, and, in a great measure, empirical, yet enables us to announce, beforehand, unusually high or low tides. No doubt such predictions of the weather, although only of a probable nature, would be highly valuable and useful, and would materially influence the practice of men in all operations thereon depending. In illustration of this, we need only refer to the value set by many farmers and others on weather-tables, founded on no sound principles, and ratified at best, if at all, only by a very partial and limited experience; or, to choose a better instance, we may cite the importance which is now attached by every seaman to the indications of the barometer, and the numerous cases with which nautical records abound, of great mischief, or even shipwreck, avoided by timely attention to its warnings.

Meteorology, however, is one of the most complicated of all the physical sciences, and that in which it is necessary to spread our observations over the greatest extent of territory, and the greatest variety of local and geographical position. It is only by accumulating data from the most distant quarters, and by comparing the affections of the atmosphere at the same instant at different points, and at the same point at different moments, that it is possible to arrive at distinct and useful conclusions. Hence arises the necessity of procuring regular series of observations made on a uniform system, and comparable with themselves and with each other, by observers at different stations, and of multiplying the points of observation as much as possible over the interior surface of continents—along sea-coasts—in islands—and in the open ocean.

The geographical position of this colony renders it perhaps the most interesting and important situation on the surface of the globe for observations of this nature: first, whether we regard it either as an advantageous station for observing the commencing action of the great counter-current of the trade-winds, where it first strikes the earth's surface, and, combined with the action of the heated surface of the African Promontory, gives rise to that remarkable alternation of south-east and north-west winds, which forms so distinguishing a feature of our

climate—or consider it, secondly, as the farthest extremity of one of the two great *lobes* of land which form the terrestrial part of our globe, and as such, constituting at once a barrier to the currents and tides of two great oceans, and a limit to their climates—or, lastly, as a great nautical station, and one not devoid of difficulty and danger, in which every consideration of practical interest combines to stimulate the curiosity of the theorist, and give importance to the results of his inquiries.

As these pages may fall into the hands of many who have been little in the habit of observing systematically, or who may not be in possession of instruments of the nicest construction, attention to the following instructions is recommended as the means of rendering their observations most available for useful purposes, and comparable with each other, and, with those intended to be referred to as standards.

I. *General Recommendations and Precautions.*

1. The continuity of observations ought to be interrupted as little as possible by changes in the adjustments of instruments—in their places—exposure—mode of fixing—or of reading off and registering them. Whenever any alteration in these or any other particulars takes place, especially such as are likely to affect the zero points, or otherwise to influence the mean results, it should be noticed in the register.

2. So far as possible, registers should be complete—but if by unavoidable circumstances of absence, or from other causes, blanks occur, no attempt to fill them up by general recollection, or by the apparent course of the numbers before and after, should ever be made.

3. The observations should, if possible, all be made by one person—but as this may often be impracticable, the principal observer should take care to instruct one or more of his family how to do it, and should satisfy himself by many trials that they observe alike.

4. The entries in the register should be made at the time of observation, and the numbers entered should be those actually read off on the respective scales of each instrument, on no account applying to them previous to entry *any sort of correction, as for instance for zero, for temperature, capillarity, &c.* All these and the like corrections, being matter of calculation and reasoning from other observations, are to be reserved till the final discussion of the series, and for separate determination and statement.*

5. If copies be taken of the registers, they should be carefully compared with the originals by two persons, one reading aloud from the original and the other attending to the copy, and then exchanging parts, a process always advisable wherever great masses of figures are required to be correctly copied.

* We regard this as of the highest importance.

6. A copy so verified, or the original, (the latter being preferred) should be transmitted regularly (if possible *monthly* from places within the limits of the colony) to the Secretary of the South African Literary and Philosophical Society, at Cape Town, which institution on its part will take care that such documents shall not merely be treasured as a dead letter in its archives, but shall be rendered available towards the improvement of Meteorological knowledge, to the full extent of their actual scientific value.

7. The register of every instrument should be kept in parts of its own scale, as read off, no reduction of Foreign measures or degrees to British being made—but it should of course be stated *what* scale is used in each instrument.

II. *Of the Times of Observation and Registry.*

Meteorological observations should be made and registered daily, at stated and regular hours. In fixing on these, some sacrifice of system must of necessity be made to the convenience and habits of the observer. The best hours in a scientific point of view would be those of Sun-rise, Noon, Sun-set, and Midnight, and these are the hours for which the registers are kept at the Royal Observatory. But these are not the hours adapted to general habits, and since the midnight observation is likely to be pretty generally neglected elsewhere than in an Astronomical Observatory, the following hours, for a division of the day into three parts, are proposed for what may be deemed the Morning, Afternoon, and Evening observations, viz.

Morning.................. 8 A. M.
Afternoon................ 2 P. M.
Evening.................. 8 P. M.

If, however, the habits or engagements of any one should not allow him to conform to these hours, rather than not observe he may select his own, specifying only what they are at the head of every page of his register, and adhering steadily to them in practice, only observing to make the extreme observations of each day equidistant from the middle one.

At the same time it will be borne in mind, that in what concerns the great Meteorological questions on which the most interesting features of the subject depend, the night is quite as important as the day, and has hitherto been far too much neglected. To any one, therefore, who may feel disposed to enter more zealously into the subject, and will not consider some personal inconvenience ill undergone for the sake of affording data of a peculiarly valuable description, this Committee would most earnestly recommend the adoption, in preference to all others, of the quaternary division of the 24 hours, as followed at the Royal Observatory above alluded to. And they leave it to the consideration of the Council, whether the keeping and transmission of registers on this principle might not advantageously be distinguished by some honorary re-

ward, as that of a Medal for instance, should the funds of the Institution admit of it.

With a view, however, to the better determining the laws of the diurnal changes taking place in the atmosphere, and to the obtaining a knowledge of the correspondence of its movements and affections over great regions of the earth's surface, or even over the whole globe, the Committee have resolved to recommend, that four days in each year should henceforward be especially set apart by Meteorologists in every part of the world, and devoted to a most scrupulous and accurate registry of the state of the Barometer and Thermometer; the direction and force of the Wind; the quantity, character, and distribution of Clouds; and every other particular of weather, throughout the whole twenty-four hours of those days, and the adjoining six hours of the days preceding and following.* The days they have been induced to fix on and recommend for these observations are, the 21st of March, the 21st June, the 21st September, and the 21st December, being those or immediately adjoining to those of the Equinoxes and Solstices, in which the Solar influence is either stationary, or in a state of most rapid variation. *But should any one of those 21st days fall on Sunday, then it will be understood that the observations are to be deferred till the next day, the 22d.* The observation at each station should commence at six o'clock A. M. of the appointed days, and terminate at 6 o'clock P. M. of the days following, according to the usual reckoning of time at the place. During this interval, the Barometer and Thermometer should be read off, and registered hourly, and the precise hour *and minute* of each reading should be especially noted.

For obvious reasons, however, the commencement of every hour should, if practicable, be chosen, and every such series of observations should be accompanied by a notice of the means used to obtain the time, and, when practicable, by some observation of an astronomical nature, by which the time can be independently ascertained within a minute or two.† As there is scarcely any class of observations by which meteorology can be more extensively and essentially promoted, it is hoped that not only at every station of importance in this colony but over the whole world, and on board ships in every part of the ocean, individuals will be found to co-operate in this inquiry. Every commu-

* This is necessary by reason of the want of coincidence of *the day* in different parts of the globe, arising from difference of longitude. In order to obtain a complete correspondence of observation for twenty-four successive hours over the whole globe, it must be taken into account that opposite longitudes differ twelve hours in their reckoning of time. By the arrangement in the text the whole of the *astronomical day* (from noon to noon) is embraced in each series, and no observer is required to watch two nights in succession.

† For example, the first appearances and last disappearances of the Sun's upper and lower border, above and below the sea-horizon, if at sea or on the coast,—or on land the exact length of the shadow of a vertical object of determinate length on an horizontal level, at a precise moment of time, (not too near noon), &c.

nication of such observations addressed by channels as secure and as little expensive as possible to the Secretary of this Institution, will be considered as highly valuable.

III. *Of Meteorological Instruments, and first of the Barometer and its attached Thermometer.*

The Barometer is the most important of all Meteorological instruments. Its office is to measure the actual pressure of the atmosphere on a given horizontal surface at the time and place of observation. Its fluctuations are observed to have considerable relation to changes in the weather, and especially of the wind. Hence its use as a weather-glass.

A Barometer should be examined, before setting it up, for air-bubbles in the tube, and for the existence of air above the mercury in the upper part of the tube. This is done by gently inclining the instrument either way from the horizontal position a little up and down; when air-bubbles, if large, will be seen to run to and fro, and must be evacuated by inverting the instrument and by gentle blows on it with the hand, driving them up into the cistern. If this cannot be done, the instrument is useless. If air exists to an objectionable amount *above* the quicksilver, it will not tap *sharp* against the upper end of the tube when the barometer is quickly inclined from a vertical position, so as to make the mercury rise above its level, nearly to the top, and then gently *jerked* lengthways and backwards. If the blow is puffy and dead, or is not heard at all, the amount of air must be considerable, and may be expelled by inversion.

In fixing the barometer, choose a good light near a window, but not exposed to sunshine, in a retired apartment, little liable to sudden changes of temperature or to drafts of wind. Adjust the tube to a vertical position by a plumb-line, and fix it so as never to shift from that position. Before reading off, give a few taps on the instrument, enough to make the upper end of the column of quicksilver *shake* visibly, as the mercury is apt to adhere to the glass and give erroneous readings. In reading, bring the index always opposite to one part. The correct part to choose is the summit of the convexity of the mercury, to which the index should be made a tangent, but if this be difficult to hit, either from the construction of the index or the want of a proper fall of light, the line of junction of the mercury and glass may be taken. In that case, the tapping should never be omitted. Whichever mode of reading is once adopted should be stated, and always adhered to. A piece of white paper placed behind the upper part of the tube will generally enable any one to read off by the convexity of the quicksilver. In placing the index, notice whether it appears to shift a little up and down as the eye is raised or depressed; this is

called Parallax, and is a source of uncertainty to be avoided by placing the eye in reading always on the *exact level* of the top of the mercurial column.

Barometric observations require corrections of three kinds, and to render them available and comparable with others, it is necessary that their amount should be ascertained, and distinctly stated. The first is called the Zero Correction. It includes several subordinate corrections arising from different sources, such as that originating in a faulty placing of the scale of inches, that due to the capillary depression of the Mercury in the glass-tube, and the constant part (which at a fixed station is nearly the whole) of the depression arising from the presence of air or vapour in the upper part of the tube.

To determine the zero correction, the Barometer must be compared with a standard instrument, such as that at the Royal Observatory for instance, or some other which has been compared with it, or with some standard of equal authority. Such comparison ought never to be omitted before forwarding the Barometer to its place of destination, nor should any opportunity be neglected of comparing it, when fixed in its place, with a good portable Barometer. In making such comparisons, all that is necessary is to record the readings of both the instruments, after at least an hour's quiet exposure, side by side, that they may have the same temperature. If compared by two observers, each should read off his own Barometer in his usual manner, and each should take a mean of several readings, then each should verify the other's results. By this means the zero of one standard may be transported over all the world, and that of all others compared with it ascertained.

The amount of the zero correction is often very large, as two or three tenths of an inch, but its influence on the mean results of recorded observations, falls wholly on the determination of the heights of the station of observation above the mean level of the sea, and effects little, if at all, any conclusions of a meteorological nature which may be deduced from them. Hence, if proper care be taken to preserve a Barometer, once set up, immoveable, a long and regular series of observation with it has a value independent of any knowledge of this element, and it is fortunate that this is the case, as the zero correction is one extremely difficult to determine exactly *a priori*.

In transporting a *compared* Barometer to its place of destination, great care is necessary. It should always be carried *upright*, or considerably inclined, and *inverted*, and over all rough roads should be carried in the hand, to break the shocks to which it would otherwise be exposed. If strapped horizontally under the roof of a colonial waggon, or tied upright against the wood-work, with its head resting on the floor, there is not a chance of its escaping destruction. Strapped obliquely across the shoulder of a horseman, however, it travels securely and

well, and with common care in this mode of transport, its zero runs no risk of change.

The next correction, and the most important of all, is that due to the temperature of the Mercury in the Barometer tube at the time of observation. To obtain this, every Barometer requires to have attached to, or fixed very near it, a Thermometer, called the attached Thermometer, which must be read and registered at each observation of the Barometer. It is preferable in practice to read off this Thermometer *first*, to avoid the error arising from breathing on, or standing long near it, while reading the Barometer itself. The zero of this Thermometer should be ascertained by comparison with a standard at the temperature of about 60° Fahr.

The third correction applicable to barometric observations arises from change of level of the mercurial surface in the cistern, owing to the transfer of a portion of its contents to or from the tube. In Barometers with small cisterns, and where the lower level cannot be adjusted at each observation, its amount may be large, and its effect being always to make the apparent fluctuation less than the real, *in a fixed proportion*, it ought, if possible, to be ascertained. The data necessary to be known are—first, the internal and external diameters of the tube—secondly, that of the cistern containing the mercury, at the surface, where the tube plunges into it. These particulars, as they must be known to the maker, ought to be inquired of him, and indeed ought to be engraved conspicuously on some part of the instrument.

Although all these corrections are necessary for the strict *reduction* of registered observations, they ought not to be applied to individual observations previous to registry. It is sufficient to know them. Their effect is in all cases easily and safely applicable to mean results, and to the conclusions therefrom deduced, and a world of troublesome and often mistaken calculations may be saved by so applying them.

Of the External Thermometer.—The External Thermometer should have a scale on which whole degrees are read off, and divisions large enough to admit of estimating tenths, or at least quarters of degrees, by the eye. It should be compared with a standard, and the difference stated, at one or more temperatures (the wider asunder the better) within the range of the climate in which it is to be used. In fixing it, choose a perfectly shaded but otherwise free exposure, and one where no *reflected* sunbeams from water, buildings, rocks, or dry soil, can reach it: and easily accessible for reading. There fix it firmly and upright. In reading it, avoid touching, breathing on, or in any way warming it, by near approach of the person. The quicker the reading is done the better.

Although read off at stated times, notice should be taken of all sudden and remarkable changes of temperature, as indicated by the external thermometer, whenever they occur. In the neighbourhood

of the Cape, and in many other parts of the continent, hot winds frequently set in with great suddenness, often in the night, and singular alternations of hot and cold temperature occur, disturbing the regular laws of the diurnal fluctuation, and connected, doubtless, with many interesting meteorological phenomena peculiar to the climate of South Africa.

Of the Maximum and Minimum, or Self-registering Thermometer.—This should be placed horizontally in some place out of doors, shaded from direct radiation and rain, and otherwise freely exposed to air, and so fastened as to allow of one end being detached from the fastening and lifted up, so as to let the indexes within the boxes slide down to the ends of the fluid columns, a more convenient mode, when the steel index is free enough to allow it, than the use of a magnet.

Both the thermometers should be read off as early as possible every morning, and the indexes re-adjusted. But as double maxima frequently, and occasionally double minima occur, in consequence of sudden changes of temperature, it is recommended occasionally to inspect both of them, with a view to ascertain whether the motion of either the mercury or spirit has been reversed in an unusual manner, and such double maxima or minima, when remarkable, should be recorded as "supernumerary," with their dates and leading features.*

The Self-registering Thermometer is extremely apt to get out of order, by the indexes becoming entangled in the column of fluid. In travelling they should not for a moment be carried with the mercury bulb downwards; if this should happen, they are *sure* to arrive in a state unfit for use. To correct them is tedious, and always hazards fracture. With great care, however, it may be done, as follows:—

1*st*, The Spirit Thermometer. By many jerks, force the index down to the junction of the bulb and tube; then, by cautiously heating and cooling alternately the bulb, the tube, or the air vessel at the top, as the case may require, the disunited parts of the spirit may be *distilled* from place to place, till the whole is collected in one column in union with the spirit in the bulb.

2*d*, The Mercurial Thermometer. When the steel index gets immersed in the mercury, it cannot be moved by a magnet, and lets the mercury pass by its side. First cool the bulb (by evaporation of either, if necessary) till the mercury is either fairly drawn down below the index, or a separation takes place in the column, leaving the index with mercury above it. Endeavour then, by tapping, warming the tube, or

* The spirit thermometer is apt to undergo a gradual change of zero by the transfer (by distillation) of part of its spirit to the upper end of the tube. It should, therefore, often be compared with the mercurial one, and the difference of readings applied as a zero. In this *only* case is the application of a zero *before* registering permissible, and indeed essential.

by the magnet, to loosen the index ever so little, then apply heat to the bulb, and drive up the index with its superabundant mercury quite into the air-vessel. This requires many trials and much patience. When there, hold the instrument bulb downwards, and suspend the index by a magnet at the top, allowing any globule of mercury to drop into the origin of the tube below; then heat the bulb cautiously over a very small clear flame of an oil lamp, till the mercury rises to the very top of the tube, and fairly unites with the globule there awaiting it. Let the bulb cool, and the mercury will sink in one united column; if not, heat it again. When this is accomplished, the index may be set loose, by withdrawing the magnet, and restored to its proper position in the tube.

A self-registering thermometer may be advantageously left (properly secured) for a whole year, or parts of a year, on elevated summits or rather remarkable points, to ascertain their maxima and minima of temperature during absence. In such cases, take care to defend them from discovery, or accident from wild animals, birds, snakes, &c. In taking it up for reading off, observe not to derange the indexes, and do not leave it without seeing that the indexes are in contact, and the temperature that of the air at the moment.

Of Thermometers buried in the Earth.—Thermometers buried at different depths, for the purpose of examining the monthly changes of temperature of the soil, should have their balls and lower part of the scale well wrapped up in woollen cloth or pounded charcoal, and should be placed in strong earthern vessels, which may be entirely withdrawn from the ground so as to allow of inspecting and reading off the scale, without exposing the balls to any possibility of changing their temperatures while under examination. The vessels should be fitted with covers, to defend the scale from injury in burying and digging up.

A pipe of earthenware (composed of separate pieces), or one of wood, may be sunk ten or fifteen feet below the surface, into dry earth, and a thermometer, defended as above, lowered *by a chain*. The pipe being then obstructed at every two feet by some stuffing readily hooked up, the thermometer may be easily examined, and a register of its indications kept with very little trouble. In like manner, the temperature of wells may be registered.

Of the Temperature of the Sea.—The surface temperature of the water at sea should be registered, as a matter of course, with the same regularity and at the same hours as the barometer and thermometer. It is more conveniently (and with quite accuracy enough for the purpose) obtained by taking up a bucketfull of the water and stirring round the thermometer in it. Whenever a change to the extent of 2° Fahr. appears to have taken place

since the last observation, a fresh bucketfull should be taken up and the observation repeated. It should also be noticed whether rain has fallen since the last observation. A sudden depression of 3° or 4° indicates the near approach of land. In a voyage from England, lately made by a member of this committee, the temperature of the surface water fell at once 9° Fahr. on approaching within a few miles of the entrance of Table Bay.

The temperature of the sea at considerable depths can hardly be regarded as a subject of ordinary meteorological inquiry and regular registry, though undoubtedly one of much physical interest, for which reason it is not considered necessary to dwell further on it.

Of the Hygrometer, &c.—In the absence of Daniell's Hygrometer, or of ether to cool it, the degree of dryness of the air may be ascertained by observing the temperatures marked by two thermometers suspended freely side by side (but not in contact) in the shade, and completely defended from all radiation *to* or *from* the *sky*, the one having its bulb and stem naked, the other with the bulb and lower part of the stem wrapped in linen or cotton, and thoroughly wetted with pure spring or rain water. The temperatures indicated by both should be noted when the wetted thermometer refuses to sink lower, and the conclusions left for subsequent calculations. The naked thermometer may be the "External Thermometer" itself, in which case a coated thermometer may be kept always suspended near it, completely screened as above mentioned, and wetted some minutes previous to the regular daily readings.

If a hair hygrometer be used, its points of absolute moisture and dryness should be frequently ascertained, as they are apt to change. The former may be found by keeping it some time in a close covered jar lined with wet blotting paper, and having water in it, and noting the point of moisture beyond which it refuses to go. The latter, by keeping it in the same manner in a jar perfectly air-tight, over fresh burnt quicklime, till it refuses to indicate a higher degree of dryness.

The best measure of the *momentary evaporating power* of the air, seems to be the depression of the wetted thermometer below the dry one. But the *actual evaporation* from a given surface, is quite another thing, and a question may very reasonably be raised, how far any useful approximation to a knowledge of the total evaporation from an extensive and diversified surface, unequally moistened, and variously exposed to the sun, defended by clouds, or refreshed by dews, *can* be obtained by any small or local experiments.

The Rain-gauge is an instrument of such extremely easy construction that any person who lives near a tin-man can procure one. In a climate so arid as that of Africa, however, it must be remembered that it will often need examination and cleansing, owing to long intervals of disuse in which insects and dust may lodge. It will often happen, too, that the

slight rain of one day, if left unregistered, will be entirely lost by evaporation in the next—nay, that slight and transient showers may never enter it, being evaporated from it as they fall. The effect of copious dew, too, must be separated from that of rain, so that the mere registry of the contents of the gauge is not of itself a sufficient indication whether rain has fallen in the night or not. However, there are usually good reasons for decision on this point from other indications. Attention to the amount of dew is very necessary, not only because the meteorological questions involved are of a high degree of interest generally, but because in arid climates the dews are of almost as much importance to the maintenance of vegetation as the rain.

In stating the quantity of rain daily received in the gauge, the height of the receiver above the soil should be mentioned, experience having shown that the quantities of rain which actually fall on a given area on the ground, and at a very moderate height above it, often differ materially. In some localities and circumstances, the rain-drops receive accession from the air as they descend, in others they undergo partial evaporation. The former is generally the case in cool moist climates—the latter may be expected in this country.

Of the Wind.—The points most important to remark respecting the wind, are,

1st, Its average intensity and general direction during the several portions of the day devoted to observation and registry.

2dly, The hours of the day or night when it commences to blow from a calm, or subsides into one from a breeze.

3dly, The hours at which any remarkable changes of its direction take place.

4thly, The course which it takes in veering, and the quarter in which it ultimately settles.

5thly, The usual course of *periodical winds*, or such as remarkably prevail during certain seasons, with the law of their diurnal progress both as to direction and intensity—at what hours and by what degrees they commence, attain their maximum, and subside, and through what points of the compass they run in so doing.

6thly, The existence of Crossing Currents at different heights in the atmosphere, as indicated by the course of the clouds in different strata. In observing these, it is advisable to fix the eye by some immoveable object, as some point of a tree or building, the sun, or the moon, otherwise mistakes are apt to arise.

7thly, The times of setting-in of remarkably hot or cold winds,—the quarters from which they come, and their courses, as connected with the progressive changes in their temperature.

8thly, The connexion of rainy, cloudy, or fair weather, with the quarter from which the wind blows or has blown, for some time previous.

9thly, The usual character of the winds as to moisture or dryness, not as deduced from mere opinion or vague estimation, but from actual observation of the hygrometric state of the atmosphere during their prevalence.

Among these particulars it will be seen that some are of a nature susceptible of daily observation and registry, while others call for an exercise of the combining and inductive faculty on the observer's part, and cannot be made out otherwise than by continued attention and habitual notice of phenomena with a view to the investigation of their laws. The general impression left upon the mind as to any of the points of this kind above enumerated, by the occurrences of the past month, will therefore be more properly stated, in the way of summary remarks at the end of the Monthly Registers, than as entries under particular days.

Of the State of the Sky.—In describing the state of the sky as to clouds, &c. the observer will bear in mind that it is only in that region of the sky which is vertically above him that the true forms and outlines of the clouds are exhibited, and the area they cover, as well as the intervals between them distinctly seen. As they approach the horizon in any direction, their extent is foreshortened by perspective, their apparent magnitude diminished by distance, and their intervals covered in and hidden by their mutual interposition. In estimating therefore the quantity of clouds in the sky, regard must be had to this, and our judgment should rather be formed on a view of the region extending from the zenith every way half way down to the horizon, that from the aspect of the heavens below that limit. It would be better to notice both, and state, separately, the proportions in which each are covered, and the quarter of the horizon towards which the chief masses in the lower region lie.

The general aspect of Clouds, as classed under the heads Cumulus, Cirrus, Stratus, &c. should be noticed, and especially the height of this inferior surface, or the level of the *vapour plane*, should be estimated. In a mountainous region this is easy, so long as the vapour plane is below or not far above the summits of the hills, and in such regions the formation and dissipation of cloud in the neighbourhood of the mountain summits, under the influence of certain winds, form a subject of study of a highly curious and interesting nature.

The formation of Clouds at night, during calm weather, under the influence of a gradually descending temperature, is another point worthy of attention. It frequently happens, that, without any perceptible wind, the sky will suddenly become hazy in some one point, and the haze condensing and spreading, in all directions, without a wind, the whole heaven will become overcast in a remarkably short time. The same thing will sometimes occur nearly at the same hour for many nights in succession. Such phenomena should be noted whenever they occur.

Two or even three strata of clouds are very common in this district of South Africa. The lowest frequently resting immediately on the land and sea. The height and thickness of these strata, their connexion with cross or opposite currents of wind in the regions where they subsist, and the laws of their formation in gradual intermixture, deserve to be studied with care, and with reference to the hygrometic state of the air at the time and place, and for several hours before and after.

Of Thunder and Lightning, and of the Electricalstate of the Air.— Connected with this part of the subject is the observation of shooting Stars and luminous Meteors. Remarkable ones should be noticed, and the moment of their appearance, their direction, duration, length of path, and *course among the Stars*, ascertained and noted, with the phenomena of their increase and decay of light, apparent size, separation into parts, trains left behind, &c. The *general* direction (if any) which they observe on particular nights, is a point also to be attended to. Such are the frequency and brilliancy of these splendid phenomena in the clear sky of this colony, that there can be no doubt of their affording an available method of ascertaining the differences of longitude of the most distant stations, if duly observed by persons furnished with means of ascertaining the time.

Thunder-storms of course will be noticed when they occur under the general head of the weather, but it is of consequence also to notice distant lightning, not accompanied with thunder audible at the place of observation (by reason of its great distance),* especially if it takes place many days in succession, and to note the quarter of the horizon where it appears, and the extent it embraces. In an actual thunderstorm, especial notice should be taken of the quantity of rain that falls, and of the fits or intermittances of its fall, as corresponding, or not, to great bursts of lightning, as also of the direction of the wind and the apparent progress of the storm with or against it.

Observations of the Electrical state of the Air in serene weather are unfortunately too much neglected. The apparatus they require is simple, and by no means costly, and may be constructed indeed by any one for himself with ease.

If the Committee in this their first Report do not dilate on this and other of the less usually practised observations of Meteorology, it is because they wish for the present chiefly to call attention to the accumulation of regular and daily observations of a more definite and numerical character. With this view they have drawn up, and by the liberal aid of Government, have procured to be printed skeleton forms, for immediate distribution among such Correspondents of the Institution, and others, as may be willing to undertake their filling up. These comprise, it is true, only the registers of the Barometer and its

* Thunder can scarcely ever be heard more than 20 or 30 miles from the flash which produces it. Lightning, on the other hand, may be seen (or at least its reflexion on the clouds, forming what is called *sheet lightning*) at the distance of 150 or 200 miles.

attached Thermometer, with that of the external Thermometer, and a column of Remarks for Wind and Weather, as being the most essential and indispensable elements of Meteorology; but it is in the power of any one who pleases to supply additional information, and to those who have leisure, instruments, and inclination for the task, the Committee would particularly recommend the regular observation of the Wet Thermometer, those of the Self-registering Thermometer and Weekly or Monthly Observations of Thermometers buried at different and progressive depths beneath the surface of the soil.

The printed forms provide for the arithmetical convenience of casting up the *means* for each month. In doing so, it is requested that care will be taken to verify the results by repetition, and (that usual sources of error may not escape notice) they recommend in every instance, before adding up the columns, to look down each to see that no obvious error of entry (as of an inch in the barometer, a very common error, or what is more difficult of detection, an error in the first decimal place) shall remain to vitiate the mean result. It is perhaps unnecessary to do more than mention the precaution of *counting* the days in *each* column on which observations occur, so as to admit of no mistake in the *divisor*, and to use throughout the decimal arithmetic in calculating the mean results. Care and exactness in these points will in most cases add greatly to the value of the communications, as it well be quite impracticable for the Committee, should observations flow in in masses, unreduced or erroneously reduced, to undertake the overwhelming task of recomputing them.

Although not, strictly speaking, a branch of meteorology, yet as the collection of observations of the Tides has been made a part of the duties of your Committee, they propose the following stations as points where it would be especially desirable to obtain regular observations of the time and height of high and low water, according to the rules and on the plan proposed by Mr. Whewell, in his late researches on this subject, and they earnestly invite communications on this head from any residents at those ports who may have leisure and take interest enough in the important questions connected with the subject.

Cape Town,	Ascension,
Simon's Bay,	Mauritius,
Port Elizabeth,	Tristan d'Acunha,
Knysna,	Madagascar,
Saldanha Bay,	Mozambique.

In Cape Town and Simon's Bay, they have the pleasure to report, that a series of observations under the superintendence of Captain Bance and Mr. Levien have already been undertaken at the instance of the Astronomer-Royal, and are now in active progress.

XIV.—*Meteorological Observations registered at the Madras Observatory during the Storm which occurred on the 30th of October* 1836.

1836	Time.	Barometer.	Correction.	Barometer reduced.	Wind.	Weather, &c.
Oct.		Inch.		Inch.		
29	10 A. M.	30,050	0,000	30,050	N.	
	Noon	30,050	....	....	N.	
	2 P. M.	29,970	....	....		
	6 „	,940	....	....	N.	
	8 „	,956	....	....		
	10 „	,950	....	....		
30	6 A. M.	,940	....	....	N.	Brisk breeze.
	7 „	,880	....	....	N.	Do. do.
	7.30 „	,864	....	....	N. N. W.	Strong wind at intervals
	8 „	,852	....	....	N. W. by N.	Do. do. rain.
	9 „	,850	....	....	N. by W.	Do. do. heavy rain.
	10 „	,795	....	....	N. by W.	Do. do. rain.
	11 „	,750	....	....	N.	Do. do. do.
	Noon	,707	....	....	N. N. W.	Approaching to a gale.
	1 P. M.	,586	....	....	N. by W.	Brisk gale—rain.
	2 „	,560	,239	29,321	N.	do. do.
	3 „	,510	,241	,269	N.	At times a violent gale.
	4 „	,360	,249	,111	N.	Very violent gale—rain
	5 „	29,150	,259	28,891	N.	Approaching to a hurricane.
	6 „	28,980	—	—	N.	Do. do.
	7 „	,915	—	—	N.	Up to ¼ before 7 the wind continued to blow a perfect hurricane; from this time up to 7 o'clock it gradually abated, and from 7 till ¼ before 8 a perfect calm ensued; from ¼ before 8 the wind began to blow from the south, moderately at first, but increasing in strength every moment.
	8 „	28,915	—	—	S.	Blowing a perfect hurricane.
	9 „	29,280	,253	29,027	S.	A violent gale.
	10 „	,500	,242	,258	S.	Do.
	11 „	,650	,235	,415	S.	A strong wind.

The barometer employed in the observations of the 29th, and up to 1 P. M. of the 30th, was the standard barometer which has hitherto been in use. At 2 P. M. the northern doors of the Observatory were burst in, and the moveable roof blown open, whereby the standard barometer and thermometer, at one rude rush of the wind, were, with telescopes, tables and chairs, overturned and broken. I was consequently under the necessity of registering the first barometer which came to hand (one by *Harris*), whose indications are given above for 2 P. M. *et seq.* To discover the error of this barometer, and to replace as well as I could the standard which had been broken, I availed myself of the old frames of the two standard barometers just alluded to (which had not been damaged), and filled two tubes which are now in use. In the first place it was desirable to examine the scales; this I was enabled to do very satisfactorily, by means of a standard two feet scale by *Adams* with the assistance of a pair of beam compasses. The divisions on one of the frames (*Dollond's*) agreed perfectly with the standard scale; but the other frame (*Gilbert's*) was in error ,025. In the next place the purity of the quicksilver was to be ascertained—having failed for several days to meet with any means of distilling quicksilver or any one who could assist me in this respect, I had recourse to washing it repeatedly in diluted nitric acid, which combining with the bismuth or antimony with which quicksilver is generally adulterated, leaves the quicksilver quite pure. I have not yet determined its specific gravity to any great degree of accuracy, for want of proper means; but from two separate experiments agreeing very well with one another, it came out 13,645; shewing that a correction 0,033 subtractive should be applied to the readings, to obtain those which should obtain were the quicksilver of standard purity. Doubtful if this or any correction was necessary, from the apparent purity of the quicksilver; I procured some very bad bazar quicksilver, and washed it with nitric acid in the same way as practised before on quicksilver, procured from the Medical stores; when the same tube, successively filled with the two sorts of quicksilver, did not differ ,010, of an inch in its indications. The quicksilver was not boiled in the tube, by reason of the danger attendant upon such an experiment; but both the tube and quicksilver were heated before being used, to a temperature of about 180 degrees. To be sure that no air or moisture existed in the tube or quicksilver, I have refilled one of the tubes three successive times, and found a difference in the third decimal place only. The particulars of these barometers are as follows:

	Dollond's scale.	*Gilbert's scale.*
Correction of the divisions........	Inches 0,000	Inches —0,025
Diameter of bore of the tube......	„ 0,19	„ 0,28
Correction due to capilliary action.	„ +0,061	„ +0,031
Relative indications..............	„ 29,958	„ 30,020

Applying the corrections due to error of division and capilliary action, the relative indications are as follows :

Dollond......	30,019
Gilbert.......	30,026
Differing..	,007

For the present I propose to consider the barometer named *Gilbert* as a standard, liable only to some very small correction for the specific gravity of the quicksilver. On comparing this barometer with that by *Harris*, (which, as I have already stated, was employed at and after 2 P.M. on the 30th); when the latter stood at 30,200, it required a correction —0,207 inches, and, on account of the large bore of the tube, and a small cistern, it should be further diminished by one-twentieth of its indications below that state. This at least is true for the indications at and near 30 inches : for indications near to and below 29 inches, however, (by reason of a sudden contraction in the cistern, whose relative capacity to that of the tube I have no means of determining without destroying the barometer) a much larger amount of correction becomes necessary. Hence, the corrections due to the indications at 6, 7 and 8 o'clock are necessarily involved in doubt, and, since any attempt to estimate their value can be but little better than a guess, I have preferred omitting them altogether. To render the observations complete, however, I here subjoin a registry which was made at an adjoining house ; having first compared the barometer with, and reduced its indications to, my present standard.

Barometrical Observations reduced to the *Gilbert* standard :

	h. m.		
1836, October 30th at	6.0	28,625	inches.
	6.55	,285	"
	7.45	,285	"
	8.30	,725	"

The above barometrical indications, as well as those which precede them, are corrected for capilliary action, and are consequently those which belong to an elevation of 27 feet above the level of the sea, and to the various temperatures under which they were taken.

The thermometrical indications are read off from a thermometer by *Bate*, which was sent out to me from England a short time before the storm ; its indications corresponded exactly with *Troughton's* standard at the temperature of 75°, but I had no opportunity of verifying it on he other divisions.

Madras Observatory.

	h.	m.	s.
Longitude..	5	21	7.7 E.
Latitude....	13	4	8.5 N.

T. G. TAYLOR,
H. C.'s Astronomer.

HORARY OBSERVATIONS MADE AT THE MADRAS OBSERVATORY, ON DECEMBER 20, 22, 1836.

1836.	Time.	Barometer.	Ther.	Wind.	Remarks.
Dec. 20	6 P. M.	29.942	74.3	N. E.	F. C. gentle breeze.
	7 „	29.948	73.1	do.	do.
	8 „	29.968	71.8	do.	do.
	9 „	29.986	71.5	do.	do.
	10 „	29.990	70.1	Calm.	Clear
	11 „	29.980	70.1	do.	F. C.
	12 „	29.972	70.0	do.	do.
21	1 A. M.	29.972	69.8	do.	Clear
	2 „	29.954	68.7	do.	do.
	3 „	29.934	67.4	do.	do.
	4 „	29.952	66.8	do.	do.
	5 „	29.958	66.2	N. E.	do. gentle breeze.
	6 „	29.962	66.0	do.	do. do.
	7 „	29.978	67.7	N by E.	do. do.
	8 „	30.000	70.5	do.	do. do.
	9 „	30.020	73.7	do.	do. do.
	10 „	30.022	76.2	N.	do. do.
	11 „	30.014	78.0	N.	F. C. do.
	12 „	29.986	77.8	N.	do. moderate breeze.
	1 P. M.	29.962	77.9	N. E.	do. do.
	2 „	29.930	79.2	do.	do. do.
	3 „	29.932	78.2	do.	Clear do.
	4 „	29.933	78.1	do.	do. do.
	5 „	29.940	76.0	do.	do. do.
	6 „	29.932	74.2	do.	do. do.
	7 „	29.952	73.8	Calm.	do.
	8 „	29.960	72.1	do.	F. C.
	9 „	29.990	72.3	N.	do.
	10 „	29.990	71.8	Calm.	Clear
	11 „	29.978	71.5	do.	F. C.
	12 „	29.976	70.9	do.	do.
	1 A. M.	29.950	70.0	do.	Clear
	2 „	29.944	68.8	do.	do.
	3 „	29.922	68.6	do.	do.
	4 „	29.916	68.0	do. E	do.
	5 „	29.924	67.8	do.	do.
	6 „	29.942	68.0	do.	Hazy
	7 „	29.964	68.4	do.	Th. do.
	8 „	29.986	70.3	do.	do. do. gentle breeze.
	9 „	29.998	73.9	N. by W.	do. do. F. C. do.
	10 „	30.000	74.3	do.	Cloudy do.
	11 „	29.996	77.8	N.	F. C. do.
	12 „	29.986	78.8	N.	Cloudy do.
22	1 P. M.	29.970	79.1	N. E.	do. do.
	2 „	29.950	80.2	do.	do. do.
	3 „	29.950	80.0	do.	Moderate breeze.
	4 „	29.950	78.5	do.	Cloudy do.
	5 „	29.942	76.1	N.	Flying clouds.
	6 „	29.944	75.6	N. E.	Haze.

METEOROLOGICAL REGISTER KEPT AT THE MADRAS OBSERVATORY FOR THE MONTH OF OCTOBER, 1836.

Days.	Barometer at Sun rise.	Barometer at 10 A. M.	Barometer at Noon.	Barometer at 2 P. M.	Barometer at Sun set.	Barometer at 8 P. M.	Barometer at 10 P. M.	Thermometer at Sun rise.	Thermometer at 10 A. M.	Thermometer at Noon.	Thermometer at 2 P. M.	Thermometer at Sun set.	Thermometer at 8 P. M.	Thermometer at 10 P. M.	Rain. Sun rise.	Rain. Sun set.	Evaporation.	Direction of Wind. Morning.	Direction of Wind. Noon.	Direction of Wind. Evening.	Remarks. Morning.	Remarks. Noon.	Remarks. Evening.
1836	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	°	°	°	°	°	°	°	In.	In.	In.						
Oct. 1	29,901	29,970	29,956	29,894	29,896	29,960	29,980	74,0	85,4	88,0	86,0	85,8	84,0	83,7				S W	S W	S E	Clear	F. Cs.	Cr. light.
2	,980	—	30,006	,970	,960	,990	,996	77,0	—	87,6	86,5	86,0	83,8	80,9				S W	E	S E	do	do	Cloudy
3	30,004	30,042	,020	,960	,950	,980	,988	7[illegible],2	85,8	87,8	88,8	85,6	82,0	79,7				W	S E	S	do	do	Clear
4	,000	,050	,032	,982	,97[illegible]	30,025	—	74,7	86,3	88,0	87,0	85,1	84,2	—				S E	S	S	do	do	Cloudy
5	,040	,086	,052	30,010	30,008	,040	30,044	77,9	85,6	87,5	85,4	83,2	83,5	83,0			2,096	N	S E	E by S	Cloudy	Clear	do
6	,054	,094	,085	,046	,04[illegible]	,076	,092	72,0	84,4	86,[illegible]	88,0	85,0	83,0	83,0				W	E	E	Clear	F. Cs.	Clear
7	,100	,136	,126	,100	,088	,090	,102	70,7	84,5	86,1	87,0	84,2	80,2	77,5				N W	E	S E	do	Clear	do
8	,090	,108	,100	,056	,040	,050	,064	67,8	82,9	85,9	88,4	85,1	81,3	80,6				W	W	S	do	do	do
9	,064	,104	,06[illegible]	,038	,020	,062	,07[illegible]	72,3	84,9	88,2	88,2	86,[illegible]	82,0	81,5				S W	N	S E	Cloudy	do	do
10	,074	—	,08[illegible]	,076	,060	,078	,088	70,9	—	89,5	88,0	85,8	84,1	81,4				S	E	S	F. Cds.	F. Cs.	do
11	,082	30,112	,100	,068	,068	,084	,090	70,0	85,2	87,3	88,2	84,9	83,8	83,5				W	E	S	do	Clear	do
12	,090	,114	,102	,080	,058	,082	,092	71,9	84,1	86,0	87,6	84,0	83,2	82,3			2,32[illegible]	W by S W	S E	S	Clear	F. Cs.	do
13	,088	,126	,110	,086	,078	,096	,104	72,0	84,5	86,3	87,4	84,5	83,4	82,8				W	S E	S S E	do	Clear	do
14	,108	,136	,122	,088	,073	,096	,106	74,1	84,2	87,2	87,5	85,0	84,2	82,5				S W	S E	E	F. Cds.	do	F.C.light.
15	,100	,136	,120	,100	,074	,098	—	73,4	86,4	87,5	88,3	85,4	83,5	—				N W	S E	N E	do	do	F. C.
16	,094	—	,108	,082	,070	,088	30,096	72,8	—	86,0	86,[illegible]	84,8	83,7	82,9				N	E	E	Clear	do	Clear
17	,084	30,122	,110	,088	,074	,090	,100	71,0	85,0	86,0	87,0	84,3	80,9	79,0				W	S E	E	Haze	do	do
18	,104	,132	,106	,086	,070	,0[illegible]2	,092	72,0	84,2	86,0	87,0	83,8	82,4	82,4				W	S E	S E E	F. Cds.	do	do
19	,106	,130	,11[illegible]	,082	,080	,096	,112	70,1	84,4	86,5	87,6	82,9	81,9	81,7			2,444	N W	E	N E	Clear	do	do
20	,100	,156	,128	,094	,090	,122	,130	68,0	84,2	85,5	86,0	82,5	81,8	81,0				N E by N	E	N E	do	do	F. Cs.
21	,112	,152	,128	,105	,088	,116	,126	67,9	84,1	84,8	85,0	82,2	81,6	80,0				N W	E	N E	F. Cds.	do	F.C.light.
22	,108	,156	,142	,092	,080	,106	,110	69,9	83,9	85,4	85,[illegible]	81,7	80,2	79,0				N	N E	N E	do	do	Clear
23	,098	,114	,088	,068	,070	,093	—	74,2	84,2	84,2	85,8	82,3	82,2	—				N.E	N E	N E	do	Th. haze	F.C.light.
24	,090	,106	,102	,078	,064	,084	—	72,0	84,0	86,0	84,8	82,0	81,7	—				N	N E	N E	Th. haze	do	Haze
25	,081	—	,090	,074	,070	,080	30,096	79,0	—	85,2	86,0	82,2	81,8	81,3				E by N E	N E	E by E	F. Cds.	F. Cs.	F.C.light.
26	,082	30,105	,088	,066	,056	,070	—	78,0	84,2	85,9	84,3	82,3	81,4	—			2,896	N E	E	N E	Th. haze	Th. haze	Cy.thr.lt.
27	,084	,088	,078	,058	,050	,060	—	73,3	81,5	82,7	85,5	80,8	80,0	—	0,667			W	N E	N E	Cloudy	Cloudy	Haze
28	,060	,080	,064	,018	,050	,054	—	73,7	82,0	84,0	85,0	81,5	80,1	—				N E	N E	N E	do	F. C.	do
29	,050	,050	,050	29,970	,040	29,956	29,950	73,8	84,3	85,0	83,5	74,6	80,6	—				N	N	N	Th. haze	Cloudy	Cy.thr.lt.
30	29,940	29,795	29,704	,321	28,713	28,644	,258	73,5	75,8	76,0	76,0	—	—	—	0,340			N	N	N and S	Cloudy	Rain	Vlt.storm
31	—	,640	,628	,618	29,620	29,690	—	—	78,4	82,0	82,0	79,9	79,8	—	7,500			—	S	S	do	Cloudy	do
Mean	30,066	30,076	30,058	30,015	29,99[illegible]	30,008	30,039	72,7	83,9	85,8	86,1	83,5	82,2	81,4	—	—	—						

Days.	Sun rise.	10 A. M.	Noon.	2 P. M.	Sun set.	8 P. M.	10 P. M.	Sun rise.	10 A. M.	Noon.	2 P. M.	Sun set.	8 P. M.	10 P. M.	Sun rise.	Sun set.	Evaporatio	Morning.	Noon.	Evening.	Morning.	Noon.	Evening.
1836	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	o	o	o	o	o	o	o	In.	In.	In.						
Nov. 1	29,689	29,750	29,742	29,695	29,689	29,720	29,740	72,9	80,3	82,4	82,3	79,9	79,7	79,6				s by w	s	s	Haze	F. Cs.	Th. haze. lt
2	,710	,750	,740	,680	,650	,700	—	73,1	82,0	82,0	81,2	80,2	79,9	—				s	s	s	Th. haze	Cloudy	Cloudy lt.
3	,700	,730	,740	,690	,689	,730	—	75,9	82,1	83,5	80,4	79,9	79,9	—				s	s w	s	Cloudy	do	F Cs. th. lt.
4	,778	,830	,820	,785	,760	,809	,830	73,7	78,8	80,4	82,0	81,3	80,1	80,0				w	N E	E	do	do	Cleardodo
5	,800	,850	,865	,815	,809	,840	,880	73,9	80,4	82,0	82,0	81,7	81,1	80,4		2,500		N by NW	s E	s E	F, C.	F. Cs.	FCs. do do
6	,840	,897	,880	,830	,819	,858	,862	73,8	81,0	81,0	82,0	82,0	81,5	80,9				N W W	E	N E	do	do	Clear do
7	,839	,880	,879	,840	,820	,860	,900	74,7	81,7	82,4	82,0	81,3	80,4	80,4				N W	E	N E	do	do	do. th. do
8	,880	,929	,940	,900	,860	,910	,930	74,2	76,3	79,0	80,5	80,9	80,5	80,0				N	N	N E	Cloudy	Cloudy	F Cs. do
9	,900	,930	,950	,910	,890	,900	,930	73,1	79,8	80,4	81,4	80,8	80,2	80,0				N	E	N E	F. C.	F Cs.	F Cs.
10	,890	,909	,910	,880	,890	,900	,908	73,0	80,0	81,0	81,5	80,9	78,5	77,6				N	N W	N E	Clear	Clear	Clear dew
11	,880	,900	,906	,856	,849	,850	,858	70,2	79,5	80,7	81,2	80,0	76,9	75,7				N E	N E	N E	do	do	do do
12	,849	,880	,890	,850	,830	,850	,870	69,1	77,9	80,6	80,7	79,8	78,3	78,0				W	N E	s E	Haze	do	do do
13	,866	,895	,900	—	,860	,920	—	71,6	80,0	81,3	—	80,3	78,8	—				N W	N E	N E	Clear	F Cs.	Cl. th. &lt.
14	,890	,930	,910	,880	,850	,890	—	71,6	78,5	80,1	80,0	78,3	77,9	—		0,135		N	E N E	N	Cloudy	Cloudy	do do do
15	,850	,900	,900	,860	,829	,840	—	72,5	80,0	78,8	79,7	78,9	78,2	—	0,587	0,327		N E	N E	N E	do	do	do do do
16	,830	,890	,890	,840	,820	,838	—	71,3	77,0	79,2	79,4	77,2	77,5	—	1,781	1,721	1,576	N	N E	N E	Rain	do	Rain. light
17	,850	,890	,880	,844	,830	,850	,870	69,1	76,0	78,6	79,8	78,0	77,5	77,4	1,347			N W	E	N E	do	do	FC s.
18	,824	,880	,876	,864	,849	,865	,854	69,9	78,2	79,7	79,8	78,2	79,9	77,5				N W	N E	N E	F. C.	do	Th. h aze
19	,840	,865	,846	,814	,790	,830	—	70,8	78,2	78,0	76,9	76,1	75,8	—		0,102		N	N	N	Th. haze	do	Cl. th. lt.
20	,779	—	,810	,726	,720	,765	—	70,0	—	74,5	72,0	71,9	—	—	1,834	7,823		N by NW	N	N by N W	Cloudy	Rain	Rain
21	—	,750	,714	,690	,689	,733	—	—	68,8	67,0	67,3	67,8	68,0	—	2,868	0,119		—	N N W	N W	do	Cloudy	Cloudy
22	,730	,810	,815	,794	,780	,812	,820	63,0	71,7	75,7	76,0	74,9	74,2	74,1				N	N	N	Clear	Clear	Cl. hy. dew
23	,810	,880	,857	,870	,805	,820	,832	65,1	76,0	87,3	78,2	76,3	74,9	73,9				N W	N N W	N	do	do	do do do
24	,800	,882	,870	,858	,855	,865	,880	67,7	76,0	76,2	79,0	76,7	74,1	72,9				N	N by W	N	Haze	Haze	do do do
25	,865	,930	,912	,869	,880	,910	,909	65,8	75,4	77,3	78,2	76,0	74,9	73,7				N	N	N E	Clear	Clear	do do do
26	,900	,965	,937	,892	,900	,925	,930	65,6	75,6	77,4	78,3	76,0	75,0	73,4				N E	E	N E	do	do	do do do
27	,910	—	,965	,920	,930	,960	,979	67,3	—	77,7	78,0	76,3	75,8	75,2				N	N W	N W	do	do	do do do
28	,950	,989	30,015	—	,960	,982	30,000	67,9	76,2	78,0	—	76,8	75,2	73,9				N	N E N	E by N	F. C.	F. Cs.	FCs. do do
29	,980	30,000	30,005	,959	,960	,980	—	67,0	76,8	79,5	77,6	76,3	75,8	—				N	N E N	E by N	Clear	Clear	Cloudy
30	,970	29,990	29,996	,954	,945	,969	—	67,9	76,4	77,6	78,3	77,0	76,3	—			1,890	N W	N E	N E	Haze	Cloudy	do
Mean	29,841	29,881	29,878	29,834	29,827	29,857	29,883	70,4	77,9	79,3	79,1	78,1	76,1	77,1									

Memorandum—The wet bulb Thermometer was broken on the 30th October.

METEOROLOGICAL REGISTER, KEPT AT THE MADRAS OBSERVATORY FOR THE MONTH OF DECEMBER, 1836.

	GILBERT'S STANDARD BAROMETER.							THERMOMETER BY BATH.							RAIN.			DIRECTION OF WIND.			REMARKS.		
	Sun rise.	10 A. M.	Noon.	2 P. M.	Sun set.	8 P. M.	10 P. M.	Sun rise.	10 A. M.	Noon.	2 P. M.	Sun set.	8 P. M.	10 P. M.	Sun rise.	Sun set.	Evaporation.	Morning.	Noon.	Evening.	Morning.	Noon.	Evening.
1836	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	o	o	o	o	o	o	o	In.	In.	In.						
Dec. 1	29,960	30,009	30,012	29,970	29,963	29,989	29,980	70,8	78,2	79,3	79,5	78,3	77,8	77,5				N.	NE.	NE.	Cloudy	Clear	F Cs.
2	,952	29,982	29,990	,955	,945	,979	,990	70,7	78,2	79,5	80,2	78,3	77,9	77,6				NE.	NW.	do	F. Cs.	do	Cr. light.
3	,979	30,000	,990	,970	,980	,990	,980	71,2	78,9	79,2	80,0	78,3	77,7	77,4				do.	NE.	do	do	F. Cs.	F. Cs.
4	,980	—	30,030	,990	,990	30,000	30,04	70,5	—	79,0	79,6	78,0	77,2	76,2				do	do	do	Clear	do	Clear
5	3. ,020	30,070	,060	30,020	30,020	,040	,050	68,6	77,7	78,0	78,8	76,8	75,9	75,0				N.	do	N.	F. Cs.	Clear	do
6	,040	,070	,060	,020	,020	,060	,030	68,0	76,3	78,4	78,3	76,3	76,1	75,8				do	do	do	Clear	F. Cs.	do
7	29,960	,080	,070	,020	,010	,050	—	67,9	77,5	78,0	78,6	77,0	76,2	—			1,520	do	E.	do	do	do	F.Cs
8	30,040	,060	,050	29,990	29,990	,010	—	67,7	76,2	78,4	76,2	74,8	74,3	—		0,120		do	N.	NE.	Cloudy	Cloudy	Cy. light.
9	29,990	,050	,020	,980	,990	,000	—	67,5	74,4	75,0	76,7	75,6	74,2	—	0,287	0,087		NE.	E.	NW.	do	do	C. rainb.
10	30,010	,070	,040	30,000	30,000	,010	3. ,010	68,3	75,7	77,2	77,8	76,3	72,1	75,8				N.	N.	NE.	F. Cs.	do	F.C. dew
11	,010	—	,030	29,990	29,980	29,990	29,98	68,5	—	76,4	77,7	76,2	74,6	73,6				do	NNE.	NE.byN.	do	F. Cs	Cr. dew
12	29,990	30,030	,010	,970	,970	,980	,970	65,7	74,8	76,8	77,5	75,8	74,1	73,7				do	N.	N.	Clear	Clear.	do
13	,970	29,990	29,980	,950	,950	,960	—	69,1	75,3	77,5	77,7	76,3	76,0	—				NE.	do	do	F. Cs.	F. Cs.	Cloudy
14	,940	30,020	,990	,950	,930	,95	—	67,9	73,0	74,5	75,6	72,9	72,5	—	0,117	0,227	1,371	N.	do	do	Cloudy	Cloudy	do
15	,930	29,990	,990	,930	,920	,960	—	67,3	75,7	74,0	75,5	73,7	73,9	—	0,180			do	do	do	do	do	do
16	,950	,990	,980	,940	,930	,980	—	68,0	7 ,8	77,5	77,8	76,3	75,8	—	0,617	0,357		NW.	E.	NE.E.	do	Clear	F. Cs.
17	,950	30,030	30,010	,950	,940	,960	29,97	69,3	76,4	78,5	78,6	76,3	75,9	75,6				N.	NE.	NE.	F. Cs.	F. C.	Cr. dew
18	,960	—	,000	,940	,94	,99	30,010	68,6	—	78,0	78,	76,5	75,6	73,9				NE.	do	do	do	do	do
19	,992	30,056	,032	,970	,980	30,012	3. ,030	65,3	74,8	76,6	76,8	75,4	74,7	73,2				do	do	do	do	Clear	F.C. dew
20	,960	,004	29,980	,920	,942	29,968	29,99	65,5	74,7	76,3	76,5	74,3	71,8	70,1				N.	do	do	Clear	F. C.	do
21	,962	,022	,986	,930	,9	,960	,990	66,0	76,2	77,8	79,2	74,2	72,1	71,8			1,100	do	N.	do	do	do	F. Cs.
22	,94	,000	,986	,950	,944	,974	30,000	68,2	74,3	78,8	8 ,2	75,6	74,4	74,5				—	do	do	Haze	Cloudy	Th. haze
23	,974	,028	30,000	,952	,932	,952	,000	69,9	75,3	78,3	78,6	74,4	74,2	73,				N.	E.	do	Cloudy	F. C.	Cr. dew
24	,960	,016	29,992	,940	,930	,948	29,970	68,8	75,2	76,0	76,7	74,2	73,3	71,6				NE.	NE.	do	F. Cs.	do	do
25	,938	29,992	,9 0	,914	,910	—	—	66,4	76,5	78,4	79,3	74,8	—	—				do	—	—	Clear	—	—
26	,91	,974	,940	,900	,892	29,924	29,950	68,0	76,1	77,7	78,0	76,2	75,8	75,5				do	NE.	do	F. C.	Coudy	F. Cs.
27	,950	30,012	,950	,950	,942	,986	—	75,5	78,3	78,0	79,5	77,7	76,1	—				do	E.	do	Cloudy	F. C.	Cloudy
28	30,008	,076	30,080	30,022	30, 20	30,054	—	73,7	78,4	80,5	78,5	77,0	76,3	—	0,097		1,383	do	do.	do	do	do	do
29	,080	,108	,086	,038	,036	,084	—	75,4	79,7	79,6	79,4	76,3	76,2	—				NE.byN.	NE.	NE.byN.	do	do	do
30	,054	,092	,066	,012	,004	,024	30,040	75,9	77,	77,6	77,5	76,0	75,2	76,0		0,027		NE.	do	NE.	do	Cloudy	do
31	29,992	,036	,002	29,954	29,942	29,978	29,998	69,3	78,1	79,3	78,8	75,8	74,3	74,0				do	do	do	F.Cs.	F. Cs.	F. Cs.
Mean	30,978	30,031	30,011	29,967	29,964	29,991	29,999	69,1	76,2	77,7	78,2	76,	75,1	74,6	—	—	—						

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MADRAS JOURNAL

OF

LITERATURE AND SCIENCE.

No. 15.—*April,* 1837.

Traditions concerning the Migration of Buddhists into Europe.
By the Reverend B. Schmid.

The Icelandic historians, to whom we owe our knowledge of the most ancient history of the north, and amongst whom Snorro Sturlesen is the chief, state that Odin or Wodan was the first conqueror and legislator of the north of Europe. In their writings the following notices are scattered.

About sixty years before the Christian era, when the Romans subdued the world, Odin, in order to remain independent, left his country, named Tyrkland, on the Caspian sea, between the Borysthenes and the Tanais, and came with his followers to the shores of the German ocean, where the nations, astonished at his wisdom and splendour, took him and his companions for messengers from the gods, and submitted willingly to their rule and instructions, because they acted with mildness and benignity. Odin united those tribes under one form of government, and made his sons their leaders.

Odin being informed that there were fine meadows in Sweden, went thither and built a town which he called Sigtun,* either after himself, for he was also called Sigge, or after one of his sons. But the Swedes named that town, *Asegarth,* i. e. the habitation (city) of the Asiatics.

Odin established the worship of the god *Thor* and the belief in immortality in *Walhalla.* A temple of Thor, near old Upsála, built by him, is said to exist still and to serve as a village church.

* *Sieg,* in German, means *Victory; Sigtun,* therefore, may mean the town of Victory, or the town of the Victor.

He extended his power far and wide, and constituted his sons viceroys in Saxony, Denmark and Norway. He even returned several times to his native country to fight against the Romans.

When Odin had firmly established his power in the countries subject to him, many Asiatics emigrated thither. A number of Swedes seems to have withdrawn from his authority and to have fled to Finland, and still farther to the north, whither Odin did not penetrate. These people were called Lappes,* i. e. fugitives. But they called themselves Sáme or Sabni.

His tomb and the tombs of his wife, Freia or Frigga, and of twenty of his successors, are still to be seen near Gamla Upsála. The northern nations came every year to the temple of Upsála, where they sacrificed, burned children, and hanged men. Until this day the peasants make pilgrimages to a spring, about a mile distant from Upsála, and memorable through ancient traditions. They drink of the water of that spring and pronounce prayers. Another tradition affirms that Odin concluded his active life at *Odensee*, one of the most ancient towns in Denmark. Thus far the Icelandic historians.

A tradition from quite a different and unsuspected source, remarkably coincides in the main point with these narrations of the Icelanders. It is one preserved by Tacitus, who says in the third chapter of his *Germania:* "Some imagine that Ulysses, in the course of his long and fabulous wanderings, was driven into this ocean, and landed in Germany; and that Ascipurgium, a place situated near the Rhine, was founded by him and named *Ασκιπυργιον*. These allegations I shall neither attempt to confirm nor to refute: let every one believe concerning them as he is disposed."

Who was this Ulysses?—We know that the original seat of the Pali and Sanscrit dialects, the language of the Buddhists and of the ancient *Brachmanes*, is to be sought in the Himalaya range, or more generally speaking, in the mountainous countries of middle Asia, from whence various tribes must have, in different ages, descended into the plains of India, and likewise emigrated towards the north and the west; —we know, likewise, that the ground-work of the Greek, Latin and German languages is Pali, Sanscrit or Pracrit; and it is a most remarkable fact that the very same day of the week, which the Tamulians call *Buden-külamei* (புதன்கிழமை or Buddhu's day), is denominated by the Teutonic nations, *Wodans-day*, (in English, *Wednesday*). This coincidence cannot have its origin in mere accident! Moreover, Ulysses certainly never came to Germany; but when the Germans related to Tacitus, or to some other inquiring Roman, that a certain Odin

* *Läufen* in high German, and *lopen* in the nether Saxon dialect, means *to run, to flee,*—hence the English word *slope*.

had come amongst them from a far country, what is more natural than that the Roman took it for granted that the Germans alluded to *Odysseus*, changing this name into *Odin*, which is certainly not so great a corruption of the Greek word, as the word *Ulysses*. The meaning of *Ascipurgium* is clear from the Icelandic tradition; *burg* (a fortress) in German is the same as *burgh* or *borough* in English; and puri and puram (புரி, and புரம்) in the Sanscrit dialects of India, and is identic with *garth* in the word, *Asegarth*, since *garth* is the same as *guard* in English, and *garde, garder* in French, viz. an *enclosure*, a fortress, a city, as well as a *garden*;—and "*Asburg in the county of Meurs*" may as well have been built by the *Asiatic* followers of Odin, as Asegarth in Sweden, and Odensee in Denmark. But I abstain from further etymologies.

Thus much seems to be evident, that Tacitus mistook Odysseus for Odin or Wodan. The same author says in his second chapter, "The Germans, in their ancient songs, which are their only records or annals, celebrate the god Tuisto (or Tuiscon), sprung from the earth, and his son Mannus, as the father and founders of their race. To Mannus they ascribe three sons"—whose names are supposed to have been Ingäff, Isläf and Hermin. We must infer from these passages, that in Tacitus' time, Wodan had not yet attained to divine honours (at least not in the western parts of Germany where Tacitus had gathered his information), and that consequently the tradition of the Icelandic historians is correct, that *one of the last immigrations of Asiatics into Germany took place at the time of the Mithridatic war.* I say, *one of the last*, for the Huns came from the mountains of middle Asia, possibly by the very same road as Odin; and the Greek and Latin languages are evidences that, long before Odin, various other tribes who spoke Sanscrit, settled on the continent of Europe.

In conclusion I cannot but advert to the judiciousness and truly philosophical spirit, which Tacitus displayed in not rejecting at once as nonsense and passing over in silence, a national tradition, although he individually was not prepared to credit it. Posterity, after nearly 2,000 years, understand the hint thus given by him, and thank him for it. And I feel persuaded that many, apparently absurd, legends scattered in the Puránams or preserved in the mouth or songs of quite illiterate tribes, if critically examined and cautiously compared with collateral historical facts, will lead to discoveries still more curious and important.

A brief notice of some of the Persian Poets.—By Lieut. T. J. Newbold.

(*Continued from* No. 14, P. 132).

Kadiri,

قادري

Or *Abdal Kadir,* was formerly in the retinue of the emperor *Akber* with *Shaikh Faizi* and *Abúl Fazel.* He compiled the *Tarikh-i-Bedawin.* His style is said to be easy and flowing.

Kamil Ahmed Beg,

کامل احمد بیگ

Son of *Mirza Afzal Nujm,* came with his father from Persia into Hindustan and entered into the service of the emperor *Alumgir,* by whom he was ennobled. He espoused the daughter of *Khan Mahomed Tahir,* vizier to *Alumgir,* and a noble of high family. He was invested with the killadarship of the fort of *Talnair* in *Khandeish.* Shortly after this, according to his biographer, " The Sultan, the soul, evacuated its fortress, its body." He is said to have composed a *Diwan,* which I have in vain attempted to procure a copy of.

Karkashi,

کارکاشي

Or *Najin-uddin,* was the panegyrist of *Khajeh Khaldi,* by whom he was preferred to his rival *Kemal-uddin Ismail Zanjáni.*

Karkhi,

کرخي

Of *Cazvin.* A poet of some genius. The following quatrain, in answer to *Seraj-uddin Kameri,* is quoted by his biographer:

رباعي

گفتی که گنه نزد من سهل بود

وین نکته نگوید انکه اواهل بود

علم از بي علت تو عصیان گردد

نزد عقلا از غا یت جهل بود

Rubái.

Thou hast said " sin in my opinion is not folly."
A man would not have spoken thus;
Wisdom would be sin, according to thy unreasonableness;
This by the wise is deemed the height of folly.

Karkhi flourished in the seventh century of the Hejira, during the reign of *Abaka Khan.*

Kashani.

كاشاني

Also called *Ghurúri,* a native of Persia who travelled into Hindustan and resided under the patronage of *Abdur Rahim Khan, Khankhanan,* to whom he dedicated a *Sáki-nameh,* written in a flowery style.

Kasim,

قاسم

Or *Kahi Kabili,* was cotemporary with *Jami,* whose society he sought. He lived nearly one hundred and twenty years. His poems are intermixed with the compositions of other authors.

Kahi was well versed in theological matters, and in the dreamy species of metaphysics, professed by those Mahomedan enthusiasts, the *Sufis.*

Kasim Anwar.

قاسم انوار

A man of rank and birth and a good poet. He is the author of a *Diwan,* flourished during the reign of *Alumgir* and was educated at Ispahan.

Kasim Khan.

قاسم خان

Author of a *Diwan.* He was brought up at the court of *Jehangir* and in 1041 A. H. was made governor of the province of *Acca* by *Shah Jehan.* He became a distinguished patron of poets. *Asef Khan* was his grand father.

Kasim Mushahedi.

قاسم مشهدي

Or *Kasim Diwáneh,* one of the disciples of *Reshid Mirza Sayeb.* According to the *Tazkirat-i-Serkhush,* he possessed a vivid imagination and an elegant manner of expression. His ideas are lofty, and his works full of abstruse allusions. He lived during the reign of *Shah Jehan.* The *Tazkirat-i-Serkhúsh,* contains a specimen of his style.

Kelim.

كليم

Or *Talib,* was born at *Hamadan* in Persia, and is a cotemporary of *Kúdsi* and *Sheida,* who flourished in the reign of *Shahjehan.* This

" nightingale of the rose-garden of literature," as he is called, when young, spent a considerable time in the acquisition of the sciences at *Shiraz*, and then travelled into Hindustan to the court of *Shahjehan*. He died on the road to *Cashmir*, whither he had been sent to versify the *Badshah-námeh*. *Mahomed Afzal*, the author of the *Tuzkiret-i-Sirkhúsh*, says that he retired to *Cashmir* after the completion of his *Zefer-nameh*. He wrote an account of *Akber-abad*, of a famine in the Deccan, and of his travels to *Cashmir*, in form of a *Masnavi*. He is also author of a *Diwan*.

Kemal uddin Ismail Isfaháni.

كمال الدين خاجندي

This poet flourished in the seventh century of the Hejira, and died A. H. 639; or, according to some authors, was slain by infidels. Doulet Shah fixes the date of his demise in 635 A. H. Among the compositions of *Isfaháni* is a *Diwan* comprizing about 9.900 couplets—a poem in eulogy of the sultans of the Syed dynasty, particularly of Sultan *Jelal-ud-din*. A collection of tracts entitled the *Russáib al Fani;* and, according to D'Herbelot, " un poeme allegorique sur les cheveux, dont le sens est fort caché, quoique le nom de cheveux soit enfermé dans chaque vers." There is much beautiful imagery interspersed throughout the compositions of this poet. *Isfaháni* was compelled to quit his native city Ispahan, on account of the persecutions of several of the principal inhabitants, who were envious of the honours he received at court. He assumed the habit of a dervise and retired to a secluded spot; where, however, the horrors of the Tartar invasion under *Genghiz Khan* soon reached him. The people of the neighbouring villages had consigned to his care all their scanty savings, in order to conceal them from their rapacious invaders. *Isfaháni* humanely acceded to their wishes and deposited the sums in a deep dry well near the hermitage. One day it unluckily happened, that a Tartar archer, shooting at a bird perched on the top of the building, dropped the ivory ring of his bow down a crevice, communicating with the well. The Tartar, in his search after the ring, found the concealed treasure. The circumstance soon became noised abroad, and the archer's comrades imagining that *Isfaháni* had more valuables hidden, put him to the torture and threw him into imprisonment. The unfortunate poet, deprived of the ordinary means of writing, was wont to pour forth the lamentations of his soul in the Tasso-like bitterness of despair, in stanzas written with his own blood on the walls of the dungeon. For farther particulars regarding *Isfaháni* the Persian reader is referred to *Doulet Shah*, the Nigaristan and the *Manár-us-suwábit*. He was styled " *Malek-us-Shora*"—the prince of poets.

Kemal-uddin Khogendi.

كمال الدين اسمعيل اصفهاني

Flourished in the eighth century of the Hejira, and died A. H. 792. He was buried at Tabriz. *Sultan Hussain* held *Khogendi* in great esteem, and loaded him with favours. *Abdal Basit* in the *Manár-us-Suwábit* states that most of the *Ghazls* contained in the *Diwan* of *Khogendi*, resemble in metre those of Hafiz ; and remarks that, " the *Ghazls* of Khogendi (for which he is celebrated) though inferior to those of Hafiz, must nevertheless hold a high place among the productions of true poets."

Khogendi performed the pilgrimage to Mecca. He died in such indigence, that nothing but a mat and a rude stone, which constituted his pillow and bed, were found in the house at his death.

Khacáni.

خاقاني

Or *Afzel-uddin Bin Ali Aiishir Shirwáni*, a celebrated poet whose compositions are remarkable for elegance of style, originality of invention and beauty of language. He died A. H. 583, and was buried at the *Mukbaret us Shora* at *Tabriz.*

He celebrated the two *Iraks*, in a poem styled, *Irakein**, and is author of two other compositions in praise of *Sultan Ala-uddin Bin-al Arslan Takash*, and *Khajeh Jemal-uddin Musuli.* The latter he sent to the *Khajeh* at *Bagdad*, who returned the compliment, not in kind, but by an ass load of " white gold," (silver). On its arrival, *Khacáni* fancied the contents of the bags to be gold ; but on discovering his mistake, petulantly exclaimed " take it back and return my poem with all speed, and I will send the *Khajeh* a satire in lieu." During the night the prophet *Khizr* appeared to the irritated poet in a dream and said—

مصرع

احسان اور دمكن كه ولي نعمت ماست

Reject not the bounty of one who is my benefactor.

Khacáni relented and sent some verses to the *Khajeh*, expressive of his grateful acceptance of the present.

* This poem, according to the author of the *Zuwábit-i-Azim* is written in the measure *Hazaj Ajzab Mukbus Mukhzuf Musaddas.*

Khacáni's native country was *Ferghaneh** in *Turkistan.* During the commencement of his career he became one of the courtiers of *Manuchehr,* sultan of *Shirwan,* but having resolved to retire from the world, he quitted the court and put on the habit of a *Zahid* (a religious recluse). The Sultan, on *Khacáni's* refusal to return, ordered him to be brought back by force, and imprisoned seven months. Our poet, who was of a vigorous turn of mind, employed himself in the composition of a *Kassideh,* in which he treated religion with such apparent contempt, that his friend *Azuri,* thought fit to write a commentary thereon, in order to clear the author from the charge of infidelity.

Khacáni, after his release, made a pilgrimage to Mecca in company with *Khajeh Jemal-uddin Mussuli,* and wrote a poem descriptive of the countries through which he travelled, and the fatigues he underwent on his way to the holy shrine. A copy of his work on the two Iraks, entitled the *Tohfet-al-Irákein,* is to be found among the valuable collection of Oriental MSS. made by Jonathan Scott, Esq.

Mention is made of *Khacáni* by *Addal Basit* in the *Manár-us-Suwábit.*

Khajeh Hatifi.

خواجه ها تفي

Nephew to the celebrated poet *Jami,* composed a *Khamseh,* taking that of *Nizâmi* as a model.

When *Shah Ismail* defeated and slew *Sheibek Khan,* sultan of the *Usbeks* prior to his taking possession of *Khorassán, Hatifi* went to visit him at the city of *Jam* in *Khorassan,* and was charged with the task of celebrating his victories in verse. The poet, however, had not composed more than a thousand couplets when "death placed the seal of silence on his lips," A. H. 900.

Khajeh Kermáni.

خواجه کرماني

Was born in the province of *Kermán* about 680 A. H. He died A. H. 742. Among his compositions are the *Rouzet-al-Anwar,* a *kemal-*

* "Farganah, nom d'une des contrées de la Transoxane, dont la ville capitale porte le même nom. Le nom d'Andoghian et d'Andugian lui est aussi commun, quoi que ce soit proprement une de ses dépendances, aussi bien que les villes de Coba et de Nessa. Ce pays s' étend le long du fleuve Sihon ou Jaxartes quoi qu'il ne soit qu'a 92 degrez de longitude, et a' 42 degrez, 20 minutes de latitude Septentrionale, selon les tables d'Abulfeda dans le cinquieme climat, quoi qué Alfragan la placé dans la fin du quatriéme."—*D'Herbelot Bibliotheque Orientale.*

nameh, several *risáleks*, and a *Diwan* comprising twenty thousand verses. The *Kitab Humai Humaiyún* is also from his pen. It is an historical poem composed at *Bagdad*, *Kermani's* favourite place of residence. From *Bagdad* he travelled into *Khorassan*. He was a disciple of *Shaikh Ola*.

There are two other poets bearing the appellation of *Kermáni. Mir* and *Akmed*. The latter was cotemporary with Tamerlane, and has left the histories of Alexander the Great, of Genghis Khan and of his patron Tamerlane in verse.

Khalis.

خالص

Author of a *Diwan*, flourished in the 12th century of the Hejira.

Khanzeman Bahádur.

خان زمان بهادر

Was one of the nobles attending the court of *Shahjehan*. He died A. H. 1044, in the subadarship of the Deccan. He is author of a *Diwan*. *Khanzeman's* father *Zemanah Beg*, commonly styled *Mukàbet Khan*, is still more celebrated for poetical talent than his son. Some account of him is to be met with in the *Tuarikh-i-hind*.

Kudsi Mushahedi

قدسي مشهدي

Came into Hindustan in the fifth year of *Shahjehan's* reign. He was courteously received and treated with the highest esteem by this monarch. The following is one of his couplets:

بيت

من آن نيم كه كنم سركشي زتيغ جفا

چو شمع زنده سرخويش ديده ام برپا

Beit.

I am not one to be driven away by the cruelty (of my mistress),
But like the burning taper, look on with erect head.

An Account of the Tribe of Mhadeo Kolies.—*By* Captain A. Mackintosh, *27th Regiment Madras Native Infantry, Commanding Ahmudnuggur Police Corps.*

(Concluded from our last).

The Goturany.—The Mhadeo Kolies have an institution or tribunal termed Goturany, composed of six persons, the establishment of which seems to be coeval with the original formation of their caste. The judicial functions of the members of the Goturany are of a serious and important nature, being to regulate and watch over the moral conduct of all the members of their community; to check the spread of licentious manners, and the infringement of the rules of their caste; to legitimatize natural offspring and to adopt children and females of other tribes into their own caste. The designation of the persons composing this court and the manner in which they conduct their proceedings I shall now relate.

1st.—Is the Ruggutwan or president.—2dly. The Mettull or deputy.—3dly. The Sablah or constable.—4thly. The Dhallia.—5thly. The Murkiah.—6thly. The Hurkiah.

The members of this court whose appointments were hereditary, acted under the authority of the chief Koly Naik of the caste, who formerly resided in Joonere. The Rugutwan resided at Raja poor, two miles from Joonere. He is a member of the Shesha Kool, one of the grand divisions of the tribe, and in addition to his juridical appointment, he was the Patell of his village. No transgressor of the rules of their caste is considered absolved and re-admitted into their tribe, until he has partaken of food from the same dish with the Ruggutwan.

It was the Ruggutwan's duty to issue instructions for the seizure and trial of such persons as were accused of having transgressed the rules and customs of their caste. However, previous to the trial, the Ruggutwan had either to wait on, or announce to, the chief Naik the particulars of the charge, and he then issued his orders for the assembling of a Punchaiut.

The Mettull assisted the Ruggutwan to the extent of his power, and was authorized to act for him in his absence. He is a member of the Keddar division of Kolies, and the president's deputy.

The Sablah is a member of the Kheersagur division, and may be considered the constable of the Goturany. It was his duty to be very much on the move, and to be constantly making enquiries respecting the conduct and habits of the people—particularly of such as were suspected of leading a licentious life; he seized accused persons and handed them over to the Ruggutwan. The Sablah when employed on a tour of duty was entitled to receive, from the village in which an offender resided, a perquisite of one rupee and a half, and a fowl.

The Dhallia is a member of the Shesha division; his designation partly explains the nature of his office, for Dhallia* means a branch. Therefore when a person, charged with having offended against the rules of the caste, refused in the first instance to obey the summons of the Ruggutwan, or he subsequently remonstrated against the decision of the Punchavit, and declared his determination of not submitting to it—measures were taken by the members of the Punchaiut to excommunicate him from his caste. The Dhallia therefore was directed to proceed to the village where the delinquent resided; upon his arrival there he announced to the inhabitants the intention of the Punchaiut to denounce the accused, for that he was about enforcing the preparatory measures for expelling him from his caste, unless he showed symptoms of repentance; otherwise it would be necessary for them to be on their guard and hold no communication with him: the Dhallia then taking a bough of the oombre or jambool tree, or of any other, if one of these was not procurable, he walked round the offender's house and afterwards placed the branch on the roof above the door.

The Hurkia is a member of the Shesha Kool or division, and his duty consisted in fastening the hurky, or bone of a dead cow, over the door of the offender's house; this proceeding constitutes the formal act of expulsion from his caste; for it completely debars him, and such of his family as may have remained in the house with him, from holding any intercourse with his other relations and friends; for such persons as dared to communicate with him, became involved in the same misery and were considered contaminated and no better than the most infamous and lowest outcast of the Hindoo community. As no more terrible calamity can well befall the Hindoo, than having the ban of excommunication fulminated against him, he will throw himself on the mercy of the Punchaiut to avoid it, or to remove it, if he has been placed under it, unless he is an inveterate rogue, or become desperately attached to some siren, who has persuaded him to abandon his family and kindred for her society.

The Murkiah is a member of the Shesha division or Kool—he forms one of the Punchaiut, and when a person has been readmitted into his caste, or a man's house and family have been polluted by some transgression against the rules of their caste, the Murkiah has to attend to see the place cleared out and the ceremony of purification performed. The Murkiah is entitled to take away with him all the murkees or earthen pots piled† up in the corner of the house, probably containing a small

* Dhallia—the branch of a bush or tree.

† All classes of natives invariably keep a small quantity of fine or rare grains, onions, salt, turmeric, spices, &c. in earthen pots of various sizes, piled up one over the other in the corners of their houses, most commonly in the apartment allotted for cooking or near it. The largest pot is at the bottom and as they successively decrease in size, the one forms

quantity of fine rice, dall and other grains, spices, onions, salt, &c. and he replaces these with new murkies: he was enabled to purchase new ones as he receives a portion of the fine that had been levied from the offender.

I have stated before, that it was customary for the Ruggutwan to apply to the chief Koly Naik for his permission to have a Punchaiut assembled for the purpose of investigating the conduct of the accused; but, previous to his doing this, he consults with the offender to ascertain with what amount he will present him if he gets him readmitted into the caste, and gives him, or to his son or daughter, one of his own children in marriage; the accused will probably mention that he will give five, ten, twenty or fifty rupees. He pays this in addition to the penalty that may be awarded against him by the Punchaiut of which the Ruggutwan gets his share also—when he was brought before him by the Sablah, four or five Patells of villages in the vicinity were summoned, and these, with the members of the Goturany, constituted the Punchaiut—a Brahmun, or person who could write, was required to be in attendance to record these proceedings; and the accused was then called on to state if he was willing to abide by the decision of the court, in which case he gave them a paper to that effect. The testimony of the witnesses for and against the accused having been taken down, also what he had to urge in his defence, the members of the Punchavit convicted or acquitted him, according to their opinion of the evidence, bearing in mind at the same time the character of the offender, the consideration and influence he possessed in their community, as well as his means of paying the fine that they might impose upon him.

If he were acquitted, and it appeared that there were not any grounds for the charge, and little or no cause whatever to suspect he had committed any crime, his accuser having failed in convicting him, was fined by the Punchaiut, and sentenced to provide an entertainment for the caste.

A portion of the fine (about one quarter of it) was presented to the chief Naik as his perquisite, about an eighth of it went to the Ruggutwan; the other members of the Goturany received a share and the different Patells who attended the Punchavit, also the person who acted as secretary, received a few rupees each. The remainder of the fine was expended in providing an entertainment for the caste, on which occasion, the offender is permitted to eat from the same dish with

a cover for the other. There is a separate cover for the upper one, so that the contents of all are secured from the attacks of rats, mice and insects. A particular person, but almost always an elderly female, has charge of these pots, as well as of the rest of the grain, ghee, &c. required for the immediate consumption of the family, and she issues from the stores each day's allowance—should she be engaged or have gone outside for a short time, no person will touch the stores, they patiently wait till she returns or has leisure to supply them with what they may want.

the Ruggutwan, and by doing so he is looked upon as absolved from his sins, and re-admitted into his caste. Therefore when the penitent has been shaved and afterwards bathed in some sacred stream, or in water (supposed to be) consecrated for the purpose, he proceeds to the place of entertainment, accompanied by a friend who takes a new thally or brass dish and a new tambia or small copper or brass pot with him, also the money required, and having approached close to where the Ruggutwan is, they sit down, the man places the rupees on the floor and puts the thally on the top of them; upon this one of the attendants puts a little of the meat into it and some water into the pot, after which the Ruggutwan invites the penitent to join him, and they successively take five grasses, or mouthfuls of the meat, which is reckoned sufficient to re-establish his purity. He is then directed to sit in the Puggut, that is with the other guests who are all going to partake of the feast. The thally and tambia become the perquisite of the Ruggutwan in addition to the rupees that were placed under the former.

In the event of the accused declining to attend the summons of the Goturany, the ceremony of excommunication was enforced against him —should he on this account complain to the government authorities, the government call on the tribe to explain the cause of their interfering with the complainant, and when the government have been informed it was on account of his having violated the rules and usages of the caste, he is told that he must abide by the decision of the Punchaiut. This generally led to his being doubly fined for the contempt of their authority, and thus complaining against them.

Should the fine imposed on the offender amount to a large sum, a portion of it was expended at times in repairing the village temple or choultry, and a few rupees presented to any sadhoo or holy character residing in the place.

When a person was convicted of a crime which was considered not one of the deepest dye, and he showed great contrition on the occasion, and was exceedingly poor, his friends urged him to entreat of the Punchaiut in the most submissive terms to forgive him. He then went to the spot near the entrance where all the shoes of the persons composing the assembly were placed, and would take ten or twelve pairs of them, tie them with a piece of string, and then place them on his head; after which he entered the room and appeared before the members of the Punchaiut in the humble position of a penitent. Seeing that he was sufficiently humbled and had not the means of paying a fine, they in general assented to his petition. The offender having obtained so much, he endeavoured to persuade the members of the court to partake of a moderate feast with him (for he would exert himself to raise ten or twelve rupees to defray the expense); the Punchaiut, aware of his poverty, would try to elude his invitation, so that he had to plant

himself in their way to prevent their going out until they gave their consent to dine with him. It was a great object for him to gain this point, otherwise, as he had acted in the manner described, and had not broken bread with the Ruggutwan, the stain would attach to his character.

A fine was required to be paid within ten or fifteen days, and the offender was not re-admitted into his caste until he had handed over the amount to the members of the Punchaiut conformably with their decision.

When a boy or girl, the offspring of an illicit connexion, was to be admitted by adoption into their caste, a feast was provided for the Goturany and a portion of the inhabitants of the village. The expense of this ceremony averaged from thirty to sixty rupees, but the amount was generally regulated according to the property the father possessed, for, if he wished to indulge his fancy, he expended a large sum. A man in very poor circumstances, who was anxious to have his child legitimatized, would go about to all his friends and entreat of them to be charitable and assist him in getting the ceremony performed; some would contribute, and, when he had collected thirty or forty rupees, the ceremony was celebrated. An extremely poor and friendless person, who could not raise a sufficient sum in the above manner, would throw himself entirely on the mercy of the Ruggutwan. As the Goturany is assembled for the purpose of hearing his petition, he takes up their shoes, which he rolls up in a piece of cloth, and enters the court; he then represents to them his utter inability to conform to the usual practice of defraying the expense of having his children admitted into the caste, and he entreats of them to adopt them as paupers. A new pot filled with water, and some coarse sugar is brought, and the Ruggutwan gives the child a little of each and the ceremony is finished.

After the feast was over the Ruggutwan engaged to conform to the usual custom of bestowing one of his own children in marriage to the newly adopted one. If all his own children had been disposed of in marriage, he was bound to get one from among his kinsmen; failing here, he had recourse to the Mettull and the rest of the Goturany as they were in duty bound to see the young convert married into one of their own families.

When a grown up female was to be admitted into the Koly caste, a feast on a rather extensive scale was prepared, to which some of the inhabitants of the surrounding villages were invited. When they had assembled, the Ruggutwan or his officer asked the woman a few questions respecting her caste, and the family she belonged to, and if she was willing to relinquish her own tribe to join them. If the Goturany were satisfied that she was telling the truth, and that she had belonged to a caste superior or equal to their own, she was admitted among them, and when the men had finished their dinner, a small quantity was left

by the Ruggutwan on his dish to which a little more was added by three or four Patells, and the dish was conveyed to the convert for her to partake of it; she was surrounded at the time by ten or fifteen Koly women, who were to bear witness to her having eaten the contents of the dish that the Ruggutwan had sent to her. This was all the ceremony they thought it necessary to attend to. The expense in former days averaged from one hundred to four and five hundred rupees. If the woman had any children they were admitted into the caste at the same time.

The Ruggutwan was entitled to receive from large or moderate sized villages annually one maund of grain of sorts, one rupee in cash, a seer of ghee and one fowl. From small villages he received four seers of grain, a half seer of ghee, a fowl and half a rupee. A portion of this allowance from the inhabitants he divided among the other members of the Goturany.

The Ruggutwan was obliged to attend the jutra at Bhuma Shunker every third year, upon which occasion he had to shave off his hair and his mustachios, preparatory to his giving an entertainment to all the Kolies of the Mhadeo division that attend the jutra. This occupied him two or three days. The allowance he received from the different villages within his jurisdiction easily admitted of his incurring this expense.

As the duties which devolved on the Ruggutwan, in the country lying between the fort of Shogur and that of Hurreechundragur, occupied his time so much that he could not always proceed into the Kotool, Rajoor and Malldesh districts when his presence was required there, he therefore constituted three persons to act as his agents in those parts of the country. These were persons of three families of Goriah, Koonda and Kondar, with a sablah attached to them.

It is necessary I should explain here that within these forty years past, the authority and influence of the members of the Goturany has greatly diminished, and little or no respect is shown to them now, in comparison to what was paid to them in former times. The people assign various causes for the change that has taken place, but chiefly ascribe it to the very great indifference with which the ex-Paishwah, Bajeerow governed the country. That the Desmookhs, the Brahmuns, Koolkurnees and Koly Naiks were permitted to do as they pleased in the hilly districts, provided they bribed the courtiers at Poona to their satisfaction. The disputes which arose between Bajeerow and his adopted brother, the late Amrootrow, withdrew for a time the attention of government from the management of the hilly districts; the Kooly Naiks and the zumeendars consequently began gradually to usurp the duties and the emoluments appertaining to the office of the Goturany. These Naiks and zumeendars frequently now adjust matters connected

with the infringement of the rules of their caste, accepting a trifling remuneration for the same, the sum being much smaller than the Goturany and a Punchaiut would have decreed them to pay. This system has been going on for many years now. If a naik or zumeendar hears of a person having violated their rules, he or she is threatened with exposure and fine; this leads to a bribe being tendered to keep silence, some five or ten rupees or probably a cow; the accused will afterwards go to some other person of influence and ask him to dine in company with him, or he himself offers to become a guest at the zumeendar's or naik's house. A few rupees are offered to this influential person. This would seem to settle the business, but some third person remarks that he does not understand how the affair has been hushed up. The chances are that this will lead to a third bribe being offered—notwithstanding this patchwork mode of adjusting matters that has latterly obtained, all the respectable people look up to the Ruggutwan as being the only qualified person to restore offenders to their caste.

The dealings of the Kolies with the Bunniahs and money-lenders.

In any account of the habits and present state of the Kolies and tribes residing in the hilly tract of country to the east and along the range of mountains termed the Syadry ghauts, it is impossible to overlook the distress and misery that have been caused more or less to every family in that part of the country, by the very exorbitant rate of interest charged for money, and the unjust and unfeeling proceedings of the Bunniahs, who are the merchants and money-lenders settled in the villages in that part of the country. Although I am disposed to think that this misery was originally produced by the excessive exactions of the rapacious agents and underlings of a despotic government on the poor and destitute Koly farmers, which compelled them to have recourse to the money-lenders to satisfy in the first place the demands of the State; I am satisfied that I can show that the bitter complaints I have often heard the Kolies make of the odious, usurious system of the Bunniahs is perfectly true. I shall confine myself to giving a full and ample explanation of the manner the Kolies, &c. and the Bunniahs manage their affairs in Rajoor as I am better acquainted with the inhabitants of that district; but the same system extends along the range of hilly country I am now giving an account of, as well as in many other places in the Dukhun.

The Bunniahs settled in Rajoor are from Guzerat. There are four distinct families; they constantly keep up a communication with their relatives and friends in their native country, and retire there when they have realised a competency to enable them to live comfortably for the

rest of their lives. The four Rajoor shopkeepers by means of agents have each established three shops in various places to supply the forty villages of this dang* and to purchase up from the cultivators whatever grain they may have for sale. It is well known that some of the zumeendars have a share in the affairs of one or two of the shops, and any person of rank countenancing or in any way lending their influence to the Bunniahs, goes far to overawe and silence the poor Kolies, and make them stifle their groans, dreading that they may have cause to repent any complaint they might venture to make against the Bunniahs. I am convinced that I state correctly in saying that their souls groan within them owing to the oppressions they have been subjected to and are obliged to endure; and that they are naturally eager to engage in any undertaking that will afford prospects of being revenged on their enemies, and obtaining toleration for the future.

These Bunniahs exercise their influence to prevent the Kolies selling their grain to any persons from a distance that may come to collect and purchase it; and if a Koly takes his grain to another district bazar, to sell it there to some little profit, the circumstance is particularly noticed by the Bunniah, the first time the Koly comes to him to ask him for the loan of any money; he immediately declines complying with his request, telling him that if he is very much in want, his friend who purchased his grain will of course supply him with any reasonable sum he may require, so he had better go and ask him for it. The Bunniahs even have expressed their displeasure at some Kolies accommodating a few of their friends at Rajoor with a small supply of grain at a trifle under the bazar rate.

The circumstances of all the Kolies, Thakoors, &c. are so well known to these Bunniahs, that when any one of them comes to ask them for a loan, they treat him much in the same manner. Any remonstrance the borrower ventures to make respecting the inferiority of the coin, the high rate of interest, the heavy bonus and the rate of exchange, is immediately answered by the Bunniah remarking "you can of course please yourself, you came here of your own accord, if you are not contented you had better go away, and apply to those that will satisfy you on easier terms." It is to be recollected that these Bunniahs supply the different inhabitants with clothes, spices, salt, tobacco, &c. besides money, and often seed-grain. They very often keep their accounts; this places the people unavoidably very much at their mercy, for there is no free market or competition to reduce articles to their proper valuation, and the management of all affairs is so controlled by these Bunniahs, from the undue influence they possess, that they have established a

* Dang, a quarter or district, but occasionally applied to a wild, hilly, and jungly tract of country.

buying and selling measure. For instance, when they go to the Kolies' houses to purchase grain, they carry a measure with them which is considerably larger than the Kolies' measure, which is the regulation size. The Bunniahs will listen to no remonstrance on the part of the Koly. The difference between the buying and selling measures varies from two to four seers in the value of one rupee's worth of grain.

The following is the mode the Bunniahs in general pursue in charging interest on any sums of money they lend to the Kolies, Thakoors, Kannaras, &c. They charge a bonus or premium of twelve or fifteen per cent. on every sum advanced by them—so they enquire of the borrower if he has brought money to pay the *munoty* (bonus), or if he is to include it in the receipt or promissory note. The Bunniah then will give the Koly eight and a half Bellapoory* rupees (these rupees vary from eight to eleven per cent. inferior to the Poona Ankooshy rupee) and takes his receipt for ten rupees, a rupee and a half being included as the bonus, and the poor man loses equal to a half rupee owing to the inferiority of the Bellapoory rupees. The Bunniah, having an eye to work, stipulates for having the money repaid to him probably in four months, and that he will receive the interest in khoorachny† seed, at the rate of one paillie (four seers) for each rupee of the debt every month. At the expiration of the fixed time, if there is a demand in the market for khoorachny, the Bunniah will send for the Koly to settle his account; otherwise he is not reminded of his debt. At the end of five or six months the Bunniah calls on him to pay up his debt (the truth is, the grain has risen in price); the account is drawn out, the interest of ten rupees a month is ten paillies of khoorachny in five months; this amounts to fifty paillies. This grain is selling at the time (Akhar and Shrawun) it is dear, and only procurable in the Bunniah's shops for about six paillies for the rupee; therefore the interest is 8¼ rupees the price of the fifty paillies, and as the Koly has no grain in hand he is under the necessity of having the interest added to the capital of ten rupees, which raises the debt to 18¼ rupees. Should he not have money to clear off this amount, he is not allowed to return to his home until he has satisfied his creditor. To effect this a fresh promissory note is drawn out for the amount, including three rupees as a bonus on the new loan, which raises the debt to twenty-one rupees. The Bunniah now informs the Koly that he will receive the money payable in ghee in the course of

* Many of the Bellapoory rupees in circulation in the small villages in the hills are of a very inferior description, either much clipped or containing much alloy. A Koly Patell who came to Ahmudnuggur some months ago on business obtained a few rupees from his Bunniah for his road expenses; for four of these he brought on to this place, he could only get twelve annas each; in fact, only three rupees, a loss of 25 per cent. to the poor man.

† A grain of which they make oil.

three or four months, if he will let him have the ghee at the rate of four seers for the rupee. He will most probably remark that such and such a person had promised to supply him with ghee at that rate, and he adds that if he (the Koly) objects to do so, that he had better pay him his money. The wretched man being at a nonplus promises to comply with the demand of his creditor; when the time arrives for delivering the ghee, the Koly will send to say that he does not possess the means of fulfilling his promise (his cattle may have died, or ghee may have been spoiled, or he may have disposed of it, or the value of it, in some other way); the Bunniah sends again for him and tells him that as he has not got the ghee, he must convert the debt into cash at the rate of the market price of the article, or on more favourable terms. Ghee happens to be selling 2½ seers for the rupee; then we have the original debt twenty-one rupees, multiplied by four seers of ghee equals eighty-four seers, which, at the rate of two and a half seers for the rupee, gives thirty-three and a half rupees. The Bunniah says if you cannot pay me this money now, you must do so at the Hooly festival, when the accounts are usually adjusted. For the accommodation of the parties another promissory note is prepared, including a bonus calculated at fifteen per cent., which brings the debt to thirty-eight rupees. The Koly is informed that, if he will agree to pay the interest in rice or in khoorachny, at the rate of four seers or one paillie for the rupee each month, he may go away to his home, but that he must be prepared to give some articles, ornaments or cattle, in pledge, as security for the payment of the debt. At the expiration of the four months the account will be as follows. Thirty-eight rupees, one paillie interest, equals thirty-eight, which in four months equals one hundred and fifty-two paillies; at the Hooly, khoorachny sells six seers for a rupee, therefore the interest will amount to 6)152(25⅓ twenty-five and one-third rupees being added to the principal raises it to sixty-three and one-third rupees. Should the Koly, either from improvidence or some misfortune, or unavoidable expense, be unable to discharge any part of the principal or interest from the time he incurred the debt, the Bunniah will now remonstrate with him and tell him that he must either pay the money, or pledge some of his cattle, as security for the debt. This being agreed to, he selects some of the Koly's best cows and buffaloes, but will only consent to them at a fifth or sixth under their value, observing, very likely, at the same time, that he does not wish to be troubled with his cattle. The unlucky debtor sees no alternative but complying with his creditor's terms. This time the promissory note is written out on stamped paper; a fresh bonus is included, and a further term of four months is agreed on for the payment; the interest to be paid in rice, ghee, or khoorachny, as may best suit the Bunniah, who tells the Koly that unless he fulfils his engagements, he will lodge a complaint in the court for the purpose of recovering his money. In the

promissory note on stamped paper the interest charged is the Dobotary, or twenty-four per cent.

If the man who has got himself thus entangled in debt is a person of considerable energy, spirited and litigious, he will attend the court in the hope of being able to obtain some redress; but in this he often fails. The vakeels (agents) employed by the plaintiff preclude his having any chance of justice done him, so the scene terminates by having his property sold to satisfy the rapacious Bunniah.

In fact the Bunniahs, before they come to the resolution of prosecuting a man in our courts, adopt every precaution to ensure his being completely ensnared before they lodge a complaint against him. Bonds, receipts &c. are all forthcoming, and duly attested; such other evidences, oral and documentary, as may be required are at hand; the victim to be sacrificed and lodged in jail is carefully selected for the purpose, in the expectation that the trial and sentence may make a more forcible impression on the other Koly debtors.

Many of these men surrender their cattle or pledged property at once to the Bunniah, rather than submit to the vexation, inconvenience, and expense of being dragged from their families and homes to attend the court at a distance, which may decree them to be imprisoned. Others of the Kolies fly to a distance from their homes to escape the tormenting calls of their creditors. Those who abscond, not unfrequently change their names, and too often subsist by leading an idle and thievish life—several of those who joined the formidable gangs that assembled in the Rajoor hills in 1828-29 & 30, were men who had become desperate from being inextricably plunged in debt. They told me, after they were captured, that they joined the gang in the hope of being able to secure some money or ornaments by plunder, to enable them to pay off their debts and reside in peace in their own village.

The poorer classes of Kolies and Thakoors are in some seasons obliged to borrow seed grain from the Bunniahs; for one maund of rice or khoorachny borrowed, they return two maunds at harvest time in ordinary seasons; but in dear years, the Bunniah gives one maund on the promise of receiving three in return. For other inferior grain a half or fifty per cent. is given to the lender. I may add here that such of the Kolies as were of a turbulent disposition and unsettled habits, not unfrequently endeavour to realize by robbery money to pay their arrears of revenue and to settle with the Bunniahs; at other times, the rogues adopted what they considered an indemnifying system with the Bunniahs, that could be neither profitable nor agreeable to the latter.

During a dark night ten or fifteen Kolies would attack the Bunniah's house. They made a point of destroying his book of accounts or any papers they could lay their hands on, by putting them in water and tearing them to pieces. They would, if greatly exasperated, take the Bun-

niah and one or two of the inmates of the house to a thicket, and pressing a naked sword on their throats, demand money. To expedite the matter, a Koly would probably give a gash to the Bunniah's ear who would instantly make an offer of all the ready money, &c., in his house. One of the party, being previously warned about not giving the alarm, on pain of death, to his comrade, is permitted to proceed to fetch the money. The Kolies cover their faces on such occasions to prevent detection. If one was recognized, it was seldom the Bunniah dared charge him openly with the crime; but some of the ill-paid and corrupt police agents would endeavour to gain the necessary information and avail themselves of the circumstances of the case to obtain a portion of the plunder, for a compromise is frequently entered into on such occasions between the robbers and the police. To guard against fire and other contingencies, the Bunniahs keep now several copies of their accounts with the Kolies. One is lodged with their partner at Rajoor. The only stone-built house and covered with tiles in the Koly villages is that belonging to the Bunniah.

I have been credibly informed that during the Paishwah's government the Bunniahs used to be occasionally warned against being too rapacious in their dealings with the inhabitants of the hills. It is said that when the Bunniahs lodged a complaint against any of these people in consequence of their refusing to pay their debts, that the government officers were directed to investigate the affair, and that, if the claim appeared to be just, an order was issued, directing that the debt was to be liquidated within a fixed time. The government officers always paid themselves twenty-five per cent. of the debt, as a remuneration for the trouble of adjusting the affair.

The above is a specimen of the mode of charging and calculating, the rate of interest for money lent by the Bunniahs; but the Koly's account is frequently a much more complicated affair than the above will give a full idea of. We may suppose that eight and a half rupees or three times that amount has been borrowed to aid in defraying the expense of a marriage ceremony, or pay up his rent or share of the revenue for the current year; the chances are that there is a small balance* of revenue for two or three successive years: then most probably follows a charge of half a rupee for a turban, also one or two rupees for a piece of cloth for himself, or a sary, for his wife. Again a charge of one or two rupees for salt, spices, oil and tobacco for six months. Then a few rupees of very inferior value may have been paid by the Koly, and a consequent deduction made, and a

* There are many lacs due of arrears of revenue for these eight or ten years past, the balance of each year distinctly recorded and annually or more frequently a small portion is paid off, but this leaves the revenue of the current year partly unpaid.

few maunds of ghee, rice or some other grain may have been tendered in part payment, and accepted at the Bunniah's price. In fact the account becomes so extremely intricate that it would require a person of considerable talent and experience in such matters to comprehend it. What is an ignorant and unlettered Koly to do in such case! Although many of these people are very simple and ignorant, they are not by any means indifferent to the difficulties they are likely to be plunged into in consequence of their dealings with Bunniahs. Not unfrequently a poor man who is very anxious to come to a settlement with his creditor, is desirous of having his account previously examined, by hearing all the different items of which it is composed read over, and the calculations of interest explained. He will signify, to the Bunniah that he intends to wait on him on such a day for the purpose and that he will bring the Patell or some intelligent friend with him, that he may be better able to understand how much he is in debt. The Bunniah contrives to defeat this plan, by probably saying, that he will be too much occupied on such a day or that he is going from home, but that if he will come alone some other day that he will explain his account fully and satisfactorily to him.

My anxiety to expose the iniquitous system of dealing that exists between the Kolies and their creditors, induces me to add a few lines more to what I have already attempted to explain on this subject. When I was in the Rajoor hills in April 1829, a very poor Koly came repeatedly to me, urging me to listen to a complaint he had to make, for that the Bunniah of Mootkell, a village in the Rajoor district, had ruined him. At length I received his petition, and forwarded it to the proper authority, intimating to him at the same time that I had not authority to interfere in such matters. The substance of the petition was this: "the Mootkell Bunniah claims ninety seers of ghee from me, although it is only five years since I settled my account with him, at which period I was five seers of ghee in his debt, but by various ways he has raised his claim in five years to ninety seers." Now these five seers would sell for two rupees when ghee was dear; so that a debt of two rupees by charging an exhorbitant interest, payable one day in money or ghee, and another day in rice or khoorachny, amounted to thirty five rupees in five years. Unfortunately this wretched man's case was not a singular one.

History of the Kolies.—We cannot expect to glean much authentic information of an historical description from an ignorant and unlettered people like the Kolies. The few traditions they possess relative to their first settlement in their present locations, and of subsequent events until within the last century, appear to be involved in much obscurity and confusion. However, there is reason to believe that they have oc-

cupied their present habitations for many ages; for we find that Ferishtah, the Mahomedan historian of the Dukhun, mentions that Ahmud Nizam Shaw, the first king of Ahmudnuggur, employed a body of Kolies in his army, and when Ahmud's grandson, Hoosain Nazam Shaw, retreated into the hills near Joonere in 1562, at the period his capital was attacked by the confederated Mahomedans and Hindoos, he was joined there by Subajee one of the Koly naiks.

There is a popular tradition among the people in this part of the country, that the Gursees were the original inhabitants of the Dukhun, and that they were displaced from the hilly tract of the country by the race of Goullies or cow-herds. These Goullies it is said, subsequently rebelled against their lawful prince, who detached an army that continued unceasing in their exertions until they exterminated the entire race of Goullies; and it is concluded that the very few who escaped the sanguinary measures that had been carried on against them, were adopted ultimately by the Kolies into their tribe and founded the Kool that bears their name. Be this as it may, there is no family in existence of the original name, but there are two (not very numerous) clans who are the descendants of the Goully Kool: namely, the Damsahs and Waghmoriahs. The Poriah family of the Kuddum Kool, and the Patkoollah clan of the Aghassy Kool, are considered to be the descendants of the Gursees.

With regard to the overthrow of the Goullies and Gursees, the Koly traditions say that these people, having been in open rebellion and plundering the country, an army from the northward advanced through Kandeish by the Kassarbary ghaut to subdue them, but that the rebels having assembled near Kassarbary, they attacked and put to flight the royal army. The king of the country, greatly incensed at this discomfiture of his army, held out prospects of high reward to the person that would head an army which would inflict condign punishment upon the rebels; the country being wild and unhealthy none of the officers in the pay of government would offer their services for this duty; but a man named Sonejy Gopall, said to have been an inhabitant of the Mahratta territory, volunteered his services. An army was then employed under Sonejy who appears to have been joined and ably supported by an active and intelligent Koly named Wunkojee Kokata, whose name and exploits are quite familiar to the Kolies of the present day. The Goullies who had resided in the hilly tract of country were attacked and completely exterminated; and Sonejy Gopall was rewarded by being appointed Desmook of fourteen hundred villages; and the Koly Kokata* was presented with the Mokassa dues of the same number of villages, but as the country previously occupied by the Goullies along

* The descendants of Wunkojee Kokata are now in possession of some right at Joonere; they have always taken a great share and interest in the Koly transactions.

the ghauts was completely depopulated, for the purpose of restoring it to prosperity, a number of Kolies from the Ballaghaut* and the Mhadeo hills were assembled and taken to the deserted dwellings of the Goullies and invited to occupy them and cultivate their fields.

It is a common practice with such of the inhabitants of the plains as bury their dead, as well as the hilly tribes to erect thurgahs (tombs commonly of a single stone), near the graves of their parents. In the vicinity of some of the Koly villages and near the site of deserted ones, several of these thurgahs are occasionally to be seen, especially near the source of the Bhaum river. The people say they belonged to Gursees and Goullies of former times. The stones with many figures in relief roughly carved upon them, and one of these holding a drum in his hand, and in the act of beating time on it, are considered to have belonged to the Gursees who are musicians by profession. The other thurgahs with a Saloonka (one of the emblems of Mhadeo) and a band of women forming a circle round it, with large pots on their heads, are said to be Goully monuments. This might be reckoned partly confirmatory of the tradition.

This account of the Kolies having come from the Ballaghaut and Mhadeo hills is certainly quite the reverse of what might have been expected; it was natural to suppose that they had migrated from the northward, as the tract of country occupied by them is bounded, both on the western and northern sides, by districts in which the Koly population is numerous, and it is quite evident that those Kolies have advanced from the northward. It is to be remarked that the Mhadeo Koly holds little or no intercourse with the other tribes in the adjoining districts. They are considered a more pure and respectable class of people. The Koonbies in the Joonere districts drink water from the hands of a Koly, and will also eat food prepared by them; the few Koonbies in the Kotool and Rajoor districts will do the same, but I believe they have some scruples on this score. However the Koonbies in Malldesh will not partake of water or food from the Mhadeo Kolies in that part of the country; this is said to be in consequence of the vicinity of the other tribes of impure Kolies, in the Nassick and Wunn Dindory districts and in the Attaveessy. If a Koonby has been working for a Koly in Malldesh he will receive rice or flour from the Koly and prepare his own victuals. Tradition says that Bhoregur, Phoolgown, &c. in the Ghorenahir, were the first villages established by the Mhadeo Kolies, and the inference we are to draw from this is, that they gradually advanced northward; to which is to be added the tradition of their having attacked and exterminated the Sombatta and Gursee inhabitants of Malldesh. Another circumstance that would tend to corroborate the

* Ballaghaut is the hilly tract along the western boundary of the Hydrabad territory.

tradition of the Kolies having come from the eastward is, that in former times all ceremonies connected with their marriages, births, and funeral obsequies were conducted by the Rawoull Goossynes of the Linggait persuasion—we know that the people of the Ballaghaut are staunch worshippers of the Ling of Mhadeo, and these priests may have accompanied the Kolies in their journey to occupy the valleys of the western ghauts. When the Paishwah attained supremacy in the government at Poona, some Brahmuns intruded themselves among the Koly habitations: these have completely usurped the duties and emoluments of the Rawoulls for seventy or eighty years past. The descendants of some of the Rawoulls are settled at Chauss and Murchur.

During the wars that were carried on in the Dukhun while the Bhaumny dynasty of kings reigned, also by the Nizam Shawhy kings of Ahmudnuggur, and subsequently by the emperors of Dhelhi in re-establishing their authority over the Dukhun, the Kolies, being a poor people and occupying a strong country, very possibly did not suffer so much from an invading force, or from the governors of provinces, as the inhabitants of the open country.

It is said that, with the view of preserving order among the Koly inhabitants, one of the kings of Bedur established a local police in each of the fifty-two valleys; a Naik and a certain number of Kolies were nominated for this duty, and the Bawun (52) choury at Joonere was fixed on as the head quarters of the police establishment. The Naiks were styled sirdars, and several of them had the title of munsubdar conferred upon them. A Mahomedan* styled munsubdar was placed in charge of the police, as a general superintendant or Sir Naik (chief Naik). However sometimes after this the Kolies from some unknown cause became very discontented, and they assembled to the number of many thousands for the purpose of demanding redress of their grievances from the king, who was passing in the vicinity of the hilly country, arranging the affairs of his government. The Koly force is said to have extended from the vicinity of Ekdurrah near the Puttah fort south and close to the Bolleshwur hills; but, as there was no person of acknowledged ability or experience among the Naiks, whom they could implicitly intrust and depute to the court as their agent to get their affairs satisfactorily adjusted, all seemed to agree that none of them could fulfil the duty so effectually as a poor Koly labourer, surnamed Pauperah, in the employ of the Awary Patell of Khirlay, and who was noted for his intelligence and sagacity. He was consequently requested to act as their chief and representative on the occasion, on which account he was presented with new clothes.

* There has been no Mahomedan Sir Naick for these 130 years; Mahomud Lattief was the last.

and such few necessaries as his new situation demanded, and all the Kolies engaged to be faithful to him and to obey him. The negotiations did not terminate favourably for the Kolies, as the prince gave orders shortly afterwards to attack them in token of his dissatisfaction. However, Pauperah, by his great activity and vigilance, continued for a series of years to defy the king's troops, and prevented them gaining any advantage over the Kolies, and so completely disgusted the officers of the royal army, by misleading and counteracting all their attempts and plans to punish the rebels, that the king ordered the troops to be withdrawn from the hilly country.

The Kolies having for such a length of time been engaged in hostilities in defending themselves from the attacks of the royal army, and finding nothing to occupy their attention at home, after hostilities had ceased, were allured to plunder the people who inhabited the Malldesh, lying between the Rajoor district and Trimbuck. The inhabitants of this tract Gursees, Sombattees, &c. were attacked and driven away and the country left desolate; however it is said that Pauperah subsequently settled for some time at the village of Mookny near the Tallghaut, where he erected a small mud fort. Having one day proceeded to pay his devotions at the shrine of the deity at Pumpry, he met five holy fakeers; one of these, placing his hand on Pauperah's head, bestowed his blessing on him and said, go down to the Konkan, take possession of Jowair and seat yourself on the Gaddy* there. The Koly replied that it could not be his destiny to be ever elevated so high; besides a Warley Rajah occupied Jowair. The saint remarked, what proceeded from his lips would be realized. Pauperah assembled a body of Kolies and proceeded northward and descended into the Attaveesy; the country around Peint and Dhurumpoor acknowledged him as their master. From this time he was saluted by his followers as Rajah Mookny Kur; and the term Mookny has been continued as the surname of the family ever since. It is said Rajah Mookny paid a visit to Guzerat, and that he prolonged his stay in Katywar for seven years; at the termination of which period he proceeded to Jowair and asked the Warley Rajah to give him as much land as the hide of a bullock could embrace. The Warley Rajah, seeing it would be impolitic on his part to offer resistance to a person of such power and influence as Rajah Mookny, consented. The hide was cut into very fine shreds or strips, and when all were united and extended along the ground, the Warley Rajah saw his small fort and dwelling embraced within the space fixed upon by Rajah Mookny. The Warley, much disheartened, remarked, as you have included my dwelling in the part you mean to occupy, it is incumbent on you to give me some place to reside in. Gumbeergur and the surround-

* A seat of honour—a throne.

ing pergunnah were given to the Warley Rajah, where his descendants continue to reside. The king of Bedur had been encamped some time at Gungapoor near Nassick when fourteen different rajahs repaired to Gungapoor to pay their homage to the prince. It is related that the Mahomedan prince ordered a sumptuous entertainment to be prepared for these rajahs, but all of them, with the exception of Rajah Mookny of Jowair, declined sitting down, as they were Hindoos. The Jowair Rajah endeavoured to remonstrate with some of them, remarking that although the king was a Mussulman he was their master. The king was much gratified with the Jowair Rajah's conduct, and ordered the covers to be removed from off the trays; to the great astonishment of all present, the dishes, which were composed of various descriptions of meats, had been miracuously converted into bunches of beautiful white jasmine flowers. The Jowair Rajah had the title of Patungshaw conferred upon him, and he was presented with dresses and seals of office, and sunnuds or commissions were granted to him, by which he was permitted to retain possession of twenty-two forts, and country yielding nine lacs of rupees of revenue. The Kolies mention that while Pauperah was in the employ of the Patell of Khirlay, a Naikwary sepoy from Akolla, who had been to Khirlay on duty, asked the Patell to allow his servant Pauperah to convey some things belonging to him to Akolla. During the heat of the day both lay down to rest themselves in the shade of a tree; the sepoy fell asleep, and when he awoke he observed Pauperah was sound asleep and a very large snake bending over him with his hood expanded. On seeing the sepoy move, the snake went off; when the Patell heard of this circumstance, he altered his conduct to his servant; he treated him much more kindly, and they ate their meals together; and when it suited him he told Pauperah if he was ever particularly fortunate in this world, and if the umbrella of royalty ever shaded his brow, he hoped he would, not forget his old friends. Eventually Rajah Mookny nominated the Patell Awary to the Patellship of the village of Mookny, and constituted him the chief manager of his domestic affairs, and his descendants are so now at Jowair.

Owing to a quarrel that took place between some members of the rajah's family about the year 1760, which led to a reference being made to the Paishwah at Poona, the Paishwah's government continued to interfere with the Jowair affairs until about 1766, when the rajah was deprived of the greater part of his country. At present he has only eighty three villages, and many of these very small. His income last year was estimated at ten thousand rupees; of this sum six thousand were realized by the customs (transit and excise duties) within his jurisdiction, and the rest was land revenue. Jowair is under the collector and magistrate of the Northern Konkan.

For a period of several generations the eldest of the family of the

Kheng clan, a member of the Wunnukphull Kool, held the Sir Naikship or chief rank among the Kolies, and was the principal authority under whom the members of the Goturany adjusted their civil and religious affairs. The Kolies speak of a very great innovation having been introduced in the mode of collecting the revenue of the Koly villages; that in some places their fields were minutely measured, and the value of each fixed, and many other matters investigated, all of which led to much oppression among them, and they resolved on resisting the establishment of the new system. There can be little doubt but that the Koly tradition here either alludes to the measures of reform that were introduced about 220 years ago throughout the kingdom of Ahmudnuggur, by that able and celebrated financier Mullik Umber, or the financial system of the famous Todur Mull, which was established in several parts of the Dukhun by the emperor Shaw Jehan. The Koly Sir Naik Kheng and all of his clan, with many other influential Naiks, thought the time favourable to make an effort to throw off the Mahomedan yoke. We know much dissension reigned among the Mahomedans of the Dukhun at the above period, but the Kolies were dreadfully punished for their temerity. The Mussulmans were highly indignant and enraged at the Koly conspiracy, not only to resist and thwart the orders of their rulers, but to endeavour to establish their own independence, or to transfer their allegiance to a person of Hindoo origin. The insurrection took place during the reign of the emperor Shaw Jehan, and the Kolies may have wished to transfer their allegiance to young Sivajee. An army was marched into the hilly country, and the inhabitants slaughtered wherever the troops could overtake them. With the exception of one or two Kolies of the name of Kheng, who contrived to conceal themselves, the Sir Naik and his kinsmen of the Kheng clan were annihilated. All the hill forts were thoroughly repaired, and a large body of troops left to garrison each, for the purpose of controlling the Kolies more effectually, and with the view of making a more lasting impression on them; all of those that had been apprehended were executed, their heads heaped together, and a platform built over them at Joonere. The place known by the name of the Kalachubootra is said to be the identical spot. After the recollection of this disturbance had passed away, Loomajee Bhokkur, Naik of Peeplegown Mhur Korha, wished to get the people to elect him their Sir Naik; and he was also desirous to obtain the approval of the government authority for his assuming it. To secure the favour of the latter, he reported that the rebels in the fort of Koary had a singularly handsome horse of a noble breed in their possession, which he would try to capture for the emperor, provided he could be furnished with a supply of money from the royal treasury. A large sum was sent to the Koly Naik, Loomajee Bhokkur, who assem-

bled the Naiks of the fifty Mawils with their retainers, and all of them marched and invaded the fort. A year and upwards having elapsed, and there being no prospect of obtaining possession of the horse, the Kolies were told that they were such faithless and such an extravagant set of people, that they could not be depended on, and, unless they captured the fort in less than one month, a number of the Naicks and followers should be put to death in a very disgraceful manner. This threat frightened the Kolies; numbers of them fled to the jungles during the night, and only the Naicks of twenty-two Mawils and their followers remained with Bhokkur, who gave his people orders to prepare their ladders of the Maryelloo, remarking that, as a sentence of death was impending over them, they had much better try to capture the fort, and die in the attempt, than submit to be disgraced. Bhokkur and his confidential friend Bhoirjee Istah, disguising themselves as dheres, sellers of firewood, ascended the fort, and succeeded in bribing one of the garrison to assist them. At the appointed time, this man drew up the ladder and secured it at the top, but when the Kolies reached the place where they were to begin to ascend by the ladder, they discovered it was four or five cubits short. Bhokkur now despaired of succeeding, but Istah cheered him on, and remarked that they both together measured much more in height than the extent of the vacant space. "We shall manage it between us; so you get up on my shoulders, and a third person can reach the ladder from off your back." They soon lengthened it, and seventy or eighty of them ascended the hill. They attacked and overpowered the guards, and were moving off with their prize, when an officer satisfied that to obtain possession of the horse was the cause of the fort being captured, fired and killed the beast on the spot. One of the Mahomedan princes being in the vicinity, expressed his great approbation of Bhokkur's daring spirit, and gave orders for his being brought to court, that he might be rewarded for his services. It is said that owing to an accident that had befallen Bhokkur, which had much disfigured his face, he was most anxious to avoid making his appearance at court; and that he dressed out a friend and despatched him, with directions to say, that he was Loomajee Bhokkur. The deception was detected and Loomajee was obliged to attend himself. When he was introduced to the prince, one of the attendants placed a shield on the Naik's head, and it was filled with as many gold mohurs as he could carry away with him. Loomajee had the title of munsubdar conferred upon him. Moreover it is stated that he built a large house at Joonere under which he had a subterraneous passage or cellar. Superstition and tradition united, maintain that all the riches Loomajee* secured at

* It is the general belief, that whoever attempted to descend into the cellar was destroyed. Some fifty years ago Dussajee Bhokkur (who was killed at Hursh) had a son

Koary and his present of gold mohurs were lodged in this underground vault, and that it remains there to the present time.

Shortly after the death of Rajah Shahoo, when the Mharratta power was in its plentitude, under the Paishwah Ballajee Bajeerow, the Poona government was anxious to obtain possession of all the hill forts in the Syhadry range. The Kolies of the Kotool and Rajoor Dangs were urged to capture the fort of Trimbuck; the clans of Kharay and Bhanggrah took the lead in this expedition, with the able assistance of the five brothers of the Puttykur family, who were all distinguished soldiers, noted for their great activity and gallantry, as well as their singular dexterity in climbing up rocky hills that were inaccessible to most men. They secured the friendship of the hereditary Kolies, the guardians of the approaches to the Trimbuck hill, and they bribed a servant belonging to the killadar; then, having sacrificed a sheep to secure the favour of the tutelary spirit of the hill, by means of their rope-ladders, five hundred of them ascended to the top of the rock, forming the scarp on the western side, and without being discovered they obtained possession of the summit of the fort; upon which they winded their horns for the information of the Moghull garrison. These were completely surprized; a few only attempted resistance; others ran about with grass in their mouths, entreating quarter; while others more frightened tried to lower themselves over the precipices, and such as were not killed were sadly mangled. Previous to approaching the fort, some of the Kolies, doubting the possibility of escalading the place, two of the Puttykurs volunteered to prove with what facility it could be done. They started and returned in a few hours with the killadar's silver hooka to convince the Kolies of the ease with which it might be seized. The Paishwah sent the Kolies forty-thousand rupees to defray their expenses. The eldest of the Puttykurs was presented with a palankeen, and Kheroojee Naik was presented with a palankeen, and the village of Barrah was conferred on him in enam (freehold) to support his dignity. Kheroojee's descendants continue to hold this village in enam under the British government; as the family are involved in debt and the Naik was a boy at the time, I suggested some years ago, that the village should be taken charge of by the collector, for the purpose of establishing the best measures to get rid of the claims against the young Naik, as he was surrounded by usurers and persons who plundered him.

whose name was Loomajee. After his father's death, and when he was about twelve years of age, it occurred to several of the friends of the family that it must have been intended that this boy Loomajee should succeed to his ancestor and namesake's treasures, and that, if he would exert himself to obtain the property by descending into the cellar, he would undoubtedly secure it. The poor boy was persuaded to try his luck by entering the vault, but he never returned to relate what he had encountered. There can be little doubt but the mephitic air destroyed him.

But to return to the subject of the hill forts. The Paishwah now expressed a wish to obtain possession of the forts of Kullurgur, Ruttungur, Allung and Koorung, which belonged to the Koly Rajah of Jowair. The same Naiks that captured Trimbuck commenced operations against Ruttungur. The Jowair Rajah and his family were at the time on this hill, but the Kolies being acquainted with one of the Mussulman jemadars of the fort, whose family was residing in one of their villages, they got him to fix the rope ladders* for them on the hill, and two hundred of them ascended to the top, but they had to fight a tough battle with the men composing the garrison, before the latter surrendered; including the loss on both sides, there were two hundred men killed and wounded. The Kolies got possession of the other forts also, and the Paishwah sent them thirty thousand rupees to pay their expenses, and Yeemajee Naik Bhauggrah, of Sakurwary was presented with a palankeen, and the village of Sakurwary was conferred in enam on him,—his descendants possess it now.

The circumstance of so many of the Koly inhabitants being either employed on the hill forts or to guard the approaches leading to them, gave the relatives of these people many opportunities of negotiating for the surrender of the forts to an enemy; for the Kolies acted frequently a very treacherous part on such emergencies. At the time of the struggle between the Mahrattas and the Mahomedans for supremacy in the Dukhun, and especially during the decline of power of the latter, and the factious and unsettled times of Raghoba Dada, it was not unusual to hear of the Kolies tendering possession of a hill fort for a bribe to a different party to that which had advanced them money to capture it, while the place continued in the hands of the Kolies; and, previous to their handing it over to the highest bidder, they carried off all the grain that was stored in the granaries.

In the year 1760, upon the occasion of the death of Heerojee Naik Baumlay of Bhoregur, one of the Koly Naiks, who retained the rank of munsubdar, which had been conferred upon one of his ancestors by the Mahomedan kings of Bedur, Jowjee Naik his son, then doing duty at Joonere, applied to the soobahdar of the province to get him nominated by the Paishwah to the situation vacated by his father, and to allow him to assume charge of the freehold lands and different emoluments that he had enjoyed. Jowjee Baumlay was of slight figure and about the middle size, with a fair complexion. He was very active and intelligent, and possessed a bold, restless and enterprising spirit; very ambitious; of irregular habits, and conniving frequently

* The ladders are made of the roots of the creepers *marr yelluh* and *yeotah yelluh*; these are twisted together, and at every cubit or so a piece of wood is fastened to be used as a step.

at his friends committing robberies in different parts of the country, while he was employed in the pay of government, before and after his father's death. I may add here an anecdote connected with the birth of Jowjee, as an instance of the superstition of the Hindoos, as they prognosticate much evil resulting from such and similar events.* It is stated that, when Jowjee was born, he came into the world reversed, or back uppermost. Such an event is reckoned not only unlucky for the infant, but likely to entail heavy misfortunes on his family. Therefore with the view of removing the evil consequence arising from such an occurrence, the customary offerings were presented to their household gods; and when the child was six months old he was taken to the banks of a river, where the roots of an oombre tree (*Ficus glomerata*) were much exposed from the water having washed away the earth. The infant was passed under one of these roots and then taken home. This ceremony is always performed on the amwass or last day of the lunar month. The fruit of this tree bears a great resemblance to the fig, and, as it is very prolific, the people draw a favourable omen from the circumstance, and hope the parents of the child may continue happy.

Jowjee Baumlay was not much liked by the people in authority at Joonere, especially by the family of the Sawunts, &c., and these persons pressed the soobahdar to reject Jowjee's claim; and, as he did not receive any reply to his petition, he felt much mortified and disgusted with the conduct of the soobahdar, and consequently quitted the place, and retired to his village, with the determination of busying himself with agricultural pursuits. But, after a lapse of a few years, his farming speculations proved unsuccessful, chiefly owing to his improvident habits; he consequently had no wish to discharge his dues to government. The Patell was aware of Jowjee's declaration of his inability to pay the rent of his farm; and, when the collector's sepoy came for it, the Patell told him he could not get Baumlay to send his share, and he had therefore better demand it himself. The Patell sent the village beadle along with the sepoy to Baumlay's house. The sepoy told him that, unless he paid his rent, he would be obliged to take him to Joonere. Jowjee managed to satisfy the sepoy, but he could not refrain from expressing his indignation and rage at the Patell's conduct in having sent a mes-

* A person that has come into the world feet foremost, is considered to be very unlucky, and in imminent danger of losing his life by lightning, and in consequence shows great symptoms of alarm during a thunder storm. Rings, made of the metal of old guns and of nails used in fastening the timbers of boats, are supposed to possess some counteracting inflence, and are worn by such persons on their arms above the elbow joint, and on their toes. The Mahomedans in India, as well as the Hindoos, have a firm belief in such things. The Kolies throw their iron crow-bar outside the door of the house during a thunder storm, to prevent the house being struck by the lightning.

sage by the village dhere to him; and at the sepoys having so unceremoniously threatened him. When the Patell heard of Jowjee's saying "that the Patell had insulted him," and a few days afterwards that he had quitted his house and proceeded to the jungles, he got seriously alarmed, dreading much that Jowjee would be revenged on him. He consequently proceeded to Joonere, and communicated all that had occurred to the soobahdar. It was very well known that the numerous robberies, committed in different parts of the country at this period, were chiefly perpetrated by Jowjee Naik's partisans, and the soobahdar, fearing a serious disturbance if Baumlay was allowed to remain in the jungles, deputed three Naiks for the purpose of explaining matters to him, and to prevail on him to return to his duty at Joonere. He was reluctantly persuaded to adopt their advice, and to accompany them. Jowjee was much thwarted in his expectations at Joonere, and became greatly discontented. A year had scarcely elapsed when the Sawunts, Sindhys, &c. communicated privately to the soobahdar their opinion of Baumlay, stating that he was an unsettled, intriguing and dangerous person, and that his dependants committed all the robberies that took place; and the only effectual mode of checking such irregularities, would be to destroy the root of the evil, and this could be executed in no other way than by imprisoning Jowjee Baumlay, and making an example of him. If instead of this they advanced him in the service and invested him with the title of munsubdar and conferred lands on him in freehold, that he would be rendered all-powerful, and the result would be that he would not rest, till he succeeded in destroying all those who discharged their duty with fidelity to government, and opposed his advancement. The soobahdar, perplexed and undetermined as to the measures to be pursued towards such a very untractable and insubordinate character, was waited on by four staunch friends (one of them a Brahmun) of Jowjee's, who had become acquainted with the advice his enemies had been instilling into the soobahdar's ears. These men pledged themselves in the most solemn manner as securities for his good behaviour, entreating that his life might not be endangered on account of the false accusations of his jealous enemies.

About this time two of the soobahdar's officers (Brahmuns) were preparing to proceed to join the Paishwah's army in the Konkan, when they were waited on by a Brahmun who had a great antipathy to Jowjee and had been plotting his destruction; he informed these two men in confidence what his plans were, and requested them to communicate them to the Beenywalla, or quarter master general of the Mahratta army, who would finally arrange matters; he further mentioned that he intended to follow in a few days, and that he would contrive to bring Baumlay with him. It so happened one day that when one of the Joonere officers was settling, with the Beenywalla (also a Brahmun),

the manner in which it would be most advisable to dispose of Baumlay, one of Jowjee's emissaries overheard the consultation, and immediately proceeded with all speed to communicate to him the danger impending over him, and convinced him that their object was to deceive him, when they pressed him to join the army with his Kolies, as they would greatly aid in recapturing some of their forts; but that their real intentions were for his destruction, as they had determined to persuade him and his Kolies that their services would be required in the attack of the Seeddie of Junjeera; and, under this pretext, they were to embark Jowjee and his friends, and when the vessel was out some distance at sea they were to sink her. The instant Jowjee learnt the particulars of this plot against his life, he fled again to the jungles (Raanburry), being satisfied that, if he continued longer at Joonere, he would be assassinated. Therefore to protect himself against the attacks of his enemies, and to force the government to comply with his wishes, he began to assemble his followers for the purpose of levying contributions from the inhabitants and to plunder travellers, &c. When the Joonere soobahdar heard this, he lost no time in detaching a party of Sibundees to seize his family, which they succeeded in doing, and brought them to Joonere, where they were placed in confinement. The troops in pursuit of Jowjee pressed him closely, and rather than exasperate the soobahdar too much, and thinking it might be of service to his family were he to remain quiet for some time, he quitted the district and went to Candeish. When a considerable length of time had elapsed, he determined to send some of his kinsmen to the Joonere jungles, to gain some intelligence of his family; accordingly seven Kolies set out secretly for their homes to pick up information for their Naik, and learn something regarding their own families. In this party there were two brothers of Jowjee, Dadajee and Soorajee Baumlay, also a cousin. The seven friends had arrived within a few koss of Joonere, when they unluckily encountered Rowjee Sawunt, who had been employed with a detachment to capture Jowjee Baumlay, and was consequently moving about the country at the time. Sawunt seized the seven Kolies, and sent them prisoners to Joonere. The people in authority, wishing to separate the brothers, Soorajee Baumlay was imprisoned in Herst, and Dadajee, and the other five Kolies, in the fort of Chaound. When Jowjee was informed of his friends having been seized and thrown into prison, he immediately advanced to the banks of the Moull river in the Kotool district, where he remained concealed; but exerted his best endeavours to rouse his friends to use their influence to obtain the release of his family, and those that had been seized by Sawunt. As Jowjee was persecuted by the Sawunt family, he watched every opportunity of striking a blow at either of the brothers, for he had latterly discovered that the Sawunts were urging the soobahdar to put

his own brothers, who were confined in the hill forts, to death; otherwise that they would contrive to effect their escape. The soobahdar at length gave his consent to the Koly prisoners being tied up in leather bags and thrown over the most precipitous part of the hill; the order was punctually carried into execution, except in the case of Soorajee Baumlay and his cousin, both of whom stated to those appointed to superintend their execution, that they were soldiers, and solicited, with the most earnest importunity, that they might not be tied up in leather bags. They asked that swords might be presented to each of them, and that, after they had excited themselves some time by fencing, they would leap over the precipice of their own accord. The demand could not, they were told, be complied with, as it was uncertain what persons placed in such desperate circumstances as they were, would be tempted to do, were they armed with swords. However they were supplied with two sticks, and the poor fellows amused themselves playing at single stick until their blood became heated, and the one sprung down the tremendous precipice after the other and were dashed to pieces. This was most distressing intelligence for Jowjee, and it was some time before he recovered from the grief and melancholy which overwhelmed him. His great friends Dewjee Bhauggrah and Dharrow Sablah consoled him with the hope of their getting his family restored. They accordingly went to Joonere, and became securities for Jowjee's family, and had them set at liberty; both of these Koly Naiks engaged to prevail on Jowjee to return to his duty at Joonere, but, owing to the impatience of the authorities there, and Jowjee's being much exasperated and having no confidence in their faith, there was little prospect of his remaining quiet. It was discovered that Jowjee was in the habit of frequently visiting Dewjee Bhauggrah, and the Joonere people sent a party of horsemen to watch his movements, and if possible to capture him, but the horsemen failed in their attempt, seized Bhauggrah and took him a prisoner to Joonere. Jowjee was now on the alert again, and having assembled some of his followers, moved in the direction of Kullumbaie, where he learnt that one of the Sawunts had erected a small wooden building on the boundary between Pakry and Kullumbaie, where he was occupied with a celebrated Goossyne in rendering himself invulnerable to the infliction of wounds by means of incantations. Jowjee was determined to avail himself of the circumstance, and instantly repaired to the spot, and attacked Sawunt and the Goossyne and put them both to death. Rajah Sawunt more enraged than ever with Baumlay, when he heard of his brother's death, went immediately to Poona, and represented at court the disturbed state of the Joonere district, and declared that there would be no peace while Jowjee Baumlay remained at large. This induced the Poona government to place between five and six hundred men at Rajah Sawunt's disposal, for the purpose of

apprehending Baumlay. When Rajah Sawunt reached Joonere and commenced operations against Jowjee, the latter retired to some distance, and he then informed his followers that the most prudent plan would be for them to disperse while Sawunt could employ so many men in pursuit of them. They consequently separated for the time, and Jowjee retained twelve of his most active, tried, and confidential friends with him. With these he secretly resolved on striking a deadly blow at Rajah Sawunt. He got his friends and emissaries to spread such reports through the country as suited his purpose. One day it was rumoured he had been seen with a large body of followers; another day that he had gone to a distance to escape the enmity of the Sawunt; and, on another occasion, it was said that Jowjee's spirit was broken, and that he was going about asking for protection from any friend that would grant him an asylum. Rajah Sawunt divided his force into several detachments, and they frequently scoured the jungles that were Jowjee's usual haunts. On these occasions they adopted for some time every customary precaution to prevent surprise at night. Rajah Sawunt was encamped on the Ombygown Puthar, and by all accounts his sentries were very vigilant; notwithstanding this, Jowjee had the ground reconnoitred, and ascertained the spot Sawunt occupied, and at midnight he advanced to the place where he slept and instantly secured him. The troops were panic-struck and hid themselves among the bushes and in ravines. Although Rajah Sawunt had no reason to hope for pity or sympathy from his enemy, yet the spirit of parental love roused him in his distressed situation to beg and implore of him to spare his son's life, as he was a boy only twelve years old. The terrified lad had concealed himself in a bush, but Jowjee spared the life of neither. Both were put to death, with several of Sawunt's men who came in the dark to his assistance. The first intimation Sawunt's family had of this distressing adventure, was the following day, by the arrival of Rajah Sawunt's fine grey mare, which came galloping home covered with blood and without her tail. Baumlay, much delighted with his success, retreated to the fastnesses of the Hurrychunder hill fort. This exploit raised him much in the estimation of the Kolies.

After Rajah Sawunt was killed, his eldest son went to Poona to urge government to carry on more vigorous measures for the apprehension of Jowjee Baumlay, and to suppress the disturbances among the Kolies. To prove how desirous the court at Poona was to punish the rebels, young Sawunt had the rank of soobahdar conferred on him, and he was placed in charge of the Joonere district. He proceeded with reinforcements to take charge of his office, but the accounts of his sudden elevation excited the envy of some of his kinsmen. One of his cousins could not control himself on the occasion, and preferred joining B[illegible] lay to acting a subordinate part under his relative. This man com-

municated the state of affairs to Jowjee, and mentioned that Sawunt had arrived at Joonere, but, as the day was not propitious for him to return to his own house, he was putting up with a friend. Jowjee, always on the *qui vive*, repaired in the evening with seven of his men to the vicinity of the house, occupied by Sawunt. They saw him looking on at a procession that was passing near him; they watched a convenient moment, rushed upon him and killed him.

Some time previous to this, he met a man who was in the confidence of Raghobah Dada; Jowjee persuaded him to represent to Raghobah Dada that he could be of great service to his interests among the hills, if His Highness would only issue his orders to him.

About this time Nana Phurnavees was very anxious to get Jowjee Baumlay apprehended; he sent for the mokassdar of Joonere, Dadjee Kokata, and explained his wishes to him, adding that, as he was one of the pensioners of government, it was a part of his duty to aid in preserving peace in the country. Dadjee expressed his readiness to afford such assistance as he could, but said that, to enable him to succeed against such an enterprising and influential person as Baumlay, the government must furnish him with two orders. The first must be to call on him to exert his influence with his Koly kinsmen to restore order in the country, and authorising him to offer any of the discontented Naiks to get their affairs adjusted at Poona, and that he had sufficient interest to obtain service for them, provided their claims should appear satisfactory. The second was an order, authorising him to destroy Jowjee Baumlay if he could in any way contrive to entrap him. Kokata was furnished with the necessary documents to assist him in executing the villanous plot he had in contemplation. A few days afterwards Kokata and his three sons accidentally encountered Jowjee Baumlay with a few followers in the jungle of Muddossy in the Ghorenahir; it occurred to Kokata to try to gain Jowjee's confidence, and he accordingly joined him; both he and his sons talked in a grumbling disaffected manner to Baumlay's people, and seemed to sympathise with them, regretting that none of Jowjee's friends had shown more zeal in his behalf in petitioning government to investigate the subject of his grievances. When they had been sitting some time conversing together, Baumlay proposed going to the river to bathe. Kokata took off his clothes and hung his jholna (bag used by natives for keeping beetle, &c.) on the branch of a tree, as there were no persons near the spot but some of Baumlay's men. One of these from curiosity peeped into the jholna, in which he saw some papers having the impression of the government seal; he took one of them out, and as Jowjee's man of business, a Mahratta, besides his cousin Black Baumlay, were near, they read the paper and discovered that it was the order authorising Kokata to put Baumlay to death. They replaced the paper

in the bag, and availed themselves of the first opportunity of communicating to Jowjee the very fortunate discovery they had made. Jowjee, in his usual firm and decided manner said, "very well, this information confirms me in the suspicion I had of these villains. We shall easily forestall them by treating them in the manner they intended to treat us." When they were asleep at night the father and three sons were put to death.

When a few weeks had elapsed Raghobah Dada sent Jowjee Baumlay letters, desiring him to capture the hill forts, and prove his zeal and capability of serving the sirkar. Jowjee had for a long time been ambitious of carrying on operations on an extended scale, but he wanted to be patronised by some person in authority to justify the Kolies in joining him. Raghobah Dada's orders were therefore hailed with joy by these people. We have the names of twenty-one Naiks who joined Jowjee with their adherents. They lost no time in descending into the Konkan, and captured the hill fort of Sidghur. The commandant of the fort had a fine gold bangle, which Jowjee deprived him of and placed on his own wrist. The fort of Bhyreghur was attacked and captured in a few days, and the fort of Kotla was also soon mastered by Jowjee; just as Kotla had surrendered, a detachment from Joonere descended the ghauts to raise the siege. Jowjee with his usual activity advanced on this detachment, attacked and put it almost immediately to flight. He had captured the fort of Gorekha, when he was informed by one of his staunch friends that Dewjee Sawunt had engaged eight Berrdurs (men who resemble the Ramoossies) to put him to death, that he made a promise of rewarding these men handsomely if they accomplished the object for which they were engaged, and, to excite their cupidity, and as an earnest of his intentions, he presented each of them with an ornamental gold ring. Jowjee's vigilance, and the zeal and fidelity of his followers, prevented the assassins succeeding in their attempt on his life.

Jowjee having been so very successful below in the Konkan, determined on trying what he could effect above the ghauts. He surrounded the fort of Ruttunghur, and, having threatened the havildar Govindrow Khary, he offered him, through a friend, six thousand rupees, if he would surrender the place—the garrison got alarmed and the gates were opened for Jowjee's men. Allung was captured and Muddungur surrendered. Nana Phurnavees, who was supreme at Poona, vowed vengeance against Baumlay, and declared he would have him blown from a gun the instant he was caught. A detachment from Poona arrived to retake the forts; Jowjee was in the Konkan at the time, but ascended the ghauts and commenced skirmishing with the Poona detachment which suffered some loss. Another detachment advanced from the Konkan, commanded by Ghorebollay, and Jowjee skirmished

with it while advancing. As Jowjee was now getting surrounded by the government troops, he informed Dada Saheb (Raghobah) that he had captured a number of the forts, but, as the Poona government had sent troops to retake them, he hoped he would receive some orders and assistance from him; all he received were letters from Dada Saheb, extolling his services and exhorting him to continue active and zealous in this cause. He sent a few things to present to those who had been most active and useful in assisting him; he added that the English had abandoned their original plans, but he did not mind this; and finished by telling Jowjee not to despair. As Jowjee had greatly excited Nana Phurnavees' wrath against him on account of his having favoured Raghobah's cause, he was now anxious to secure the friendship of some persons of rank and influence to protect him from the minister's vengeance. Jowjee was on this account more desirous of holding the forts, until he could obtain safe and secure terms for himself and his followers. He sent two of his friends to Dhondoo Mhadeo, the agent of the soobahdar of Nassik, who was his most intimate friend, to ask his advice and assistance, and Bhauggrah the Patell of Mullarpoor, a great friend of his, was applied to on this occasion, as Bhauggrah was a horseman in Tookajee Holkur's army, and a favourite of Holkur. In the mean time Ghorebollay was exerting himself to seize Baumlay and capture the forts. On one occasion Jowjee was seen ascending the Ruttunghur fort, and Ghorebollay ordered all his men to advance round the hill to stop all communication with the fort, and to prevent any person escaping. Some time after it became dark, Jowjee descended the hill by himself, and, notwithstanding every precaution that had been taken, he proceeded to join some of his friends on an adjoining hill; and Ghorebollay, to his great astonishment, heard two days afterwards that Jowjee had gone off to the northward, levying contributions, and plundering and burning the villages that refused him supplies. Ghorebollay was in the habit of severely chastising the Kolies, for not showing greater zeal and activity in aiding the troops, and not making known to him where Jowjee and his rebels were in the habit of concealing themselves. When Jowjee and his followers were moving along the summits of a high range of hills at some distance, the people occasionally ventured to point them out to the troops. It appearing doubtful whether Ghorebollay would succeed in recovering the hill forts, or in capturing Jowjee Baumlay, government gave their assent to settling the Koly disturbance by negotiating with Baumlay for the surrender of the forts. Dhondoo Mhadeo sent a confidential message to Jowjee, recommending him to continue quiet, and if possible to join Tookajee Holkur's army, and in the meantime he would not forget his interests; that he must surrender the forts to him and that this would enable him to obtain favourable terms hereafter, but that he

durst not mention the home of Baumlay to Nana Phurnavees at present, as he seemed fully resolved on punishing all the rebels but particularly himself. Jowjee made up his mind to follow Dhondoo Mhadeo's advice; he joined Holkur, who readily promised to speak to Nana Phurnavees in his behalf, which he did, and suggested that Jowjee should be directed to assemble a body of Kolies and join the army before the fort of Loghur. The Kolies joined the army, and Jowjee was called upon to exert himself now in the cause of government; he had some capital rocket men, and he advanced one of these to a favourable position, and pointed out to him the direction in which he was to fire his rocket. Most fortunately one of the rockets fell among some powder, near the door of the magazine on the hill, which caused an awful explosion, and obliged the garrison to surrender. Jowjee was so delighted with the rocket man's conduct, that he took his bangle off his own wrist and placed it on the others.

Holkur, it is supposed, had been in the habit of secretly providing Baumlay with ammunition and stores, to give him a better opportunity of annoying the government; this was to serve his own aims at the time. When Holkur quitted Poona for Hindoostan, Jowjee accompanied him to Chandoor, where he remained till Dhondoo Mhadeo had obtained an act of oblivion for him from Nana Phurnavees. It was represented to government that the best policy it could adopt, would be to conciliate Jowjee and retain him in the interest of government, by giving him a permanent appointment; that it seemed a most desirable and important measure to preserve order in the hilly country, and, as no one seemed better calculated for controlling the Koly Naiks in the Rajoor districts than Jowjee Baumlay, it was ultimately determined that a new soobah should be established at Rajoor, under the designation of the Rajoor soobah; the forty villages of that district, twenty-two of Malldesh, and in the Konkan sixty villages of the Sakoorly district, twelve of the Baryajnoop, and sixteen of the Jurry Serooosy districts, constituted the new soobah. The soobahdar was to collect the revenue and pay the men employed in the hill forts, as well as the other police of the district. The revenue of the soobah was not always sufficient to cover the expenditure; four or five thousand rupees were almost annually drawn from the pergunnahs of Sinneer or Sungumnair. The soobahdar in his magisterial character had only authority to punish Kolies guilty of theft and gang robberies; but this was equivalent to the power of life and death, as the punishment inflicted was chopping off their feet or hands, and in consequence they frequently bled to death, their friends being afraid to approach, until it was too late, to afford them necessary assistance. Persons who had committed capital crimes were kept in confinement, until orders regarding the disposal of them

were received from Poona; the usual punishment for such men was to blow them from a gun.

Jowjee Baumlay was nominated Naik munsubdar of the Rajoor soobah, and sixty men placed immediately under him; a portion of these had the rank of Naiks, the rest were sepoys. They did twelve month's duty for eleven month's pay; they received one or two rupees advance of pay every month, and their account was settled every six months, or once a year; one month's pay was deducted on account of durbar khureh or court expense. Jowjee had the village of Takeed, in Malldesh, worth eight hundred and fifty rupees annually, conferred on him in Jahageer, and he received additional pay yearly five hundred rupees; in all 1350 rupees from government, besides which he was presented with a bhett rupee from each village in the soobah, and also received some ghee and a small quantity of grain; when he moved about the district on duty, each village was obliged to furnish him and his followers with provisions.

Bhauggrah of Sukkurwary and Khoray of Barray, with their quota, were placed under Jowjee Baumlay's superintendence. The pay of the different grades of this police establishment was fixed and paid at the above period; it had not been altered for upwards of forty years; a few years after the British took possession of the country a very considerable reduction was made in the pay of each quota; this led to much discontent among the local Koly police, but they were restrained from showing openly their dissatisfaction, from the large number of Sibundees stationed as police guards over the country; this will be partly alluded to hereafter. It will suffice here to state, that Jowjee was drowned when crossing the Mool river near Kotool. It is said he was not very sober at the time, and it is supposed that Istah, one of the Koly Naiks, led him to a deep part of the river and then shoved him forward, when Jowjee fell off the rock into the pool, and, when he was struggling in the water, Istah, who had a dislike to him, took advantage of the circumstance, and struck him a blow on the head, which made him sink immediately; this was in July 1789. At the time Jowjee was drowned, he was proceeding to Poona, with one of the Raneehs from Jowair, whose cause he had espoused, and he entertained hopes of getting her affairs favourably settled and forwarding his own views at the same time. Jowjee was succeeded by his son Heerojee Naik.

In the year 1776 several of the Silkunda Kolies, of the village of Oottoor, had a quarrel with the Patell respecting their right to some ground in the village; and, as the Patell and district authorities refused to do them justice, they assembled a large party of their friends and others and commenced plundering the surrounding villages, and pursuing other violent measures, in the hope of obtaining redress. Troops from Poona were employed in pursuit of them, and by some lucky chance

(through the management of the widow Rukmabair of Chass) these surprised the Kolies and killed and wounded many of them. The Koly leaders were consequently forced to disperse their followers. The government officers, having learnt that Suttoo Silkunda and Kokata, the two chiefs of the insurgents, were wandering about the jungles by themselves, made the villagers of the Ambygown district promise to capture the robbers. The better to ensure this, they obliged them to enter into the Sunkly zammeeny, or chain security, (one Patell going security for two or three cultivators, another respectable Patell for five or six poorer Patells, and a Desmook for a number of the Patells, &c). Silkunda and Kokata, hearing of the measures the government officers were adopting, moved off to another quarter; this was partly for their own safety, and partly to save their friends from being harassed and punished for not fulfilling their promise of apprehending them. After the troops retired from the jungles, the Kolies recommenced their operations. Several seasons were passed in this way; however when Jowjee Baumlay was settled at Rajoor he was ordered by government to prepare to proceed in pursuit of the rebels. These did not wish to come to blows with Baumlay, and it appeared to be a more prudent and politic plan to enter into some terms of accommodation with those in power, and they effected this through the aid of a Brahmun acquaintance. Circumstances compelled these Kolies to remain quiet for upwards of four years, when Sunttoo Silkunda repaired again to the jungles, in consequence of the dispute about his hereditary rights not having been adjusted.* The troops employed against the Silkunda gang this time, soon forced them to disperse, and the chiefs were induced to go in the direction of Aurungabad. They had taken an oath that they would cut off the Patell of Oottoor's head, unless government afforded them redress. Nana Phurnavees was resolved on making a severe example of these Kolies. He declared that he would not pardon them again, as they were such a treacherous race and as no faith could be reposed in them. At length one of their friends consented to be-

* In adjusting boundary disputes between the Kolies during the Mahomedan supremacy, they were in the habit of making the Kolies swear on the Koran. There are some documents several hundred years old, detailing the adjustment of boundary disputes, by which some idea may be formed of the Patellships that have been sold, otherwise transferred or become extinct, &c.

No subject of quarrel is more necessary to be attended to by us than the settlement of boundary disputes and hereditary claims to dues; more especially when such occur in a hilly or jungly district. No pains ought to be spared on such occasions to ascertain the original cause of the quarrel, and all the merits of the case. The greater the number of the most respectable Patells and other persons associated in the investigation, the greater is the prospect of the disputants being satisfied with the decision, and, in the event of one of the parties being discontented, there is less chance of his adopting violent measures to gratify his revenge, aware that such a large portion of the most influential number of the community would be opposed to his wild scheme.

tray them; this man detached a few Kolies disguised as Goossynes, who gained information respecting the place of their retreat, and a detachment that marched to apprehend them was so fortunate as to bring them all prisoners to Joonere, where the five Silkundas were executed. Bulwuntrow Beriah, brother-in-law to Nana Phurnavees, was soobahdar of the district at the time, and it is asserted Beriah became very unhappy after the execution of these men; that either from remorse or some other cause he had no peace of mind. Therefore in the hope of re-establishing the tranquillity and happiness that he had enjoyed, and of which he had been latterly deprived, he erected a temple on the banks of the river near Joonere, in which was placed as the object of worship a Punah Lingh, or five stones representing the five Silkunda Kolies who had been executed under his instructions, expecting that the sacrifices and prayers that might be offered at the shrine would tend to render him happier.

At the above period there was one of the females of the Silkunda family of Oottoor (Taie Silkunda) a clever, bold, and enterprising woman* who had her name enrolled as one of the police sepoys of Joonere. She never avoided her tour of duty, and when she appeared in public, she always had her bow and arrow in her hand, and a couple of well filled quivers strapped cross-wise on her back.

The circumstance of seeing the son of Jowjee Baumlay settled comfortably at Rajoor, led to some discontent and jealousy among the Koly Naiks of the district. The family of the Bhauggrah Patell of Deogowne near Rajoor at the above period (the end of the year 1798), consisted of three brothers, Govindjee, Myajee and Walloojee; they were all bold, active, and enterprising men, especially Walloojee. They availed themselves of the general feeling to assemble some Kolies, and

* In 1831 at the time I was engaged superintending the operations carried on for suppressing the insurrection of the Ramoossies in the Poona collectorate. The civil authority of the district granted passports to various persons who expressed an anxiety to obtain leave to go in pursuit of the notorious Oomiah, in the hope of being able to capture him and to secure the reward tendered for his apprehension. One of the most noted of these was a widow named Luchmy Ghantighy; she was a tall, stout woman, with coarse features marked with the small pox, and of a daring and enterprising spirit. At the above period she left Poona with a detachment of Sibundees or irregular sepoys, armed with matchlock guns, and accompanied by a Brahmun accountant or man of business. Luchmy having discarded her sarhy, attired herself in a pair of trowsers, an angrika (a long jacket) and a waistband and turban. Like a native chieftain or soldier she had a sword stuck in her waistband, and her shield fastened on her back. Thus accoutred she led her heroes forth and lost little or no time in commencing operations, conformably to the good old Mahratta system of accusing and then extorting fines from suspected persons, and such as were said to favour the Ramoossy insurgents. Those who were thus oppressed by her fled to me at Sassoor to entreat for protection; Luchmy, uncertain what these complaints might lead to, repaired with her followers to Sassoor, and, by way of excusing herself, said she could not control the persons that had engaged to serve her, and who, it seemed, had unjustly levied some money from the villagers.

commenced plundering in the Konkan. At the termination of a few months Govindjee Naik was seized and confined in the hill fort of Koorung; Myajee fled to a distance and shortly afterwards died, and his son Ramjee remained with the uncle Walloojee for the two seasons that he continued his marauding system. Govindjee was executed, and it was hoped this would have sufficiently intimidated Walloojee, and forced him to abandon his predatory schemes; but it had an opposite effect. Walloojee became outrageous, and increased his gang to upwards of a thousand men; with these he used to march into the Konkan, drums beating and flags flying. The inhabitants of the low country were always panic-struck when they heard that the Kolies were descending to ravage their homes. Walloojee was in the habit of dividing his gang into three or four parties, and little or no resistance was offered to his men, except those villages in which troops were stationed. On a named day they re-assembled at a particular place in the ghauts; divided the plundered property, and retired with all rapidity and secrecy to their homes. Walloojee kept a few active and trust-worthy men with himself, while he remained in retirement near Inchore; for the Jahageerdar of that place, greatly befriended him. However the Koly munsubdar, Heeroojee Naik, at length succeeded in capturing him, and, after some difficulty, brought him to Rajoor, where he was blown from a gun.

Shortly after the death of Jowjee Baumlay, the inhabitants of two villages in the Kotool district had a quarrel about the division of the land of a deserted village, and the appropriation of the offerings made at the shrine of the idol of the deserted place. This led ultimately to the Bheels in the neighbouring hills being called in by one of the parties; however, as some Bheels had about the year 1800 plundered some travellers, the circumstance brought on a skirmish between the Koly watchmen of Oottoor and the Bheels, in which the latter had one of their Naiks killed; the following season the Bheels* assembled in force and plundered the koly habitations around Joonere, Oottoor and Kotool. A large body of Sibundees was sent in pursuit of them, under one of the Koly Naiks, who punished them

* The Bheels put in a claim about six years ago for the kukwalldarship of the Kotool district, which was of course rejected, and the hereditary Koly watchmen were re-appointed. The Bheels for many years past have been gradually encroaching and usurping from the Ramoossies and the Kolies the office of village watchmen. It would seem good policy to prevent the advance of the Bheels to the hilly country. The residence of those at present settled in the Ahmudnuggur district is confined to the open country, and as they are a more hardy and robust people than the Kolies, and partake of all kinds of animal food, were they to secure a residence in the hilly country, the probability is, that it would be a more difficult matter to quell a disturbance among them than among the Kolies.

severely, and forced them to ask Heeroojee Baumlay, the Koly munsubdar, to afford them an asylum, tendering him an offering at the same time of four thousand rupees; but the government agent directed Heeroojee to attack the Bheels with his Kolies, and that he should be re-enforced by some of the men of the hill forts. The Bhauggrah Naik of Sakurwary determined to degrade or destroy Heeroojee, thinking the opportunity favourable for getting rid of him, as the Bheels were encamped only a short distance from Sakurwary. Bhauggrah prepared a feast for Baumlay, and made him partake copiously of the spirits sent round, and by talking of the exploits of their fathers, Baumlay became excited and was induced to march at night to surprise the Bheels. Bhauggrah sent to warn the Bheels of the munsubdar's approach, and he employed various means of dispersing Baumlay's force, so that at dawn there were only a few men with the munsubdar; they were all killed or wounded; Heeroojee himself fell under fourteen wounds. The Bheels restored him after his friends agreed to pay several thousand rupees as a ransom for him. The Bheels now established thannas at Kotool, Akolla and Sungumnair, as the wealth of the village of Kotool, &c. had been placed in the fort of Koonjurgur. The havildar of the fort named Sawunt wished to secure it to himself; and had, as he thought, planned a scheme that would satisfy every person, that the property had been seized and plundered by the Bheels. To serve his purpose a few of the Bheels were admitted into the fort, but these fellows outwitted Sawunt, for they instantly put him to death, and carried the valuables off with them. Troops from Poona and the Konkan, &c. were marched into the hilly country, against the Bheels, who were, after a few skirmishes, obliged to disperse in all directions; after which, offers of pardon were held out to them, and, shameful to say, the government took advantage of these treacherous means and put hundreds and hundreds of the Bheels, their women and children to death by massacrying them in cold blood, and throwing them in deep wells, &c.

When Walloojee Naik was executed, his nephew Ramjee Bhauggrah fled into the Konkan, and took refuge with a maternal uncle then employed at Kullian; but this man also turned a great robber, and was pursued, seized and executed, and young Ramjee ascended the ghauts and joined the Bheel insurgents. He acted a conspicuous part in all their subsequent measures; and as he continued turbulent and very troublesome, long after the Bheel disturbance was suppressed, the government officers thought it would be good policy to engage him in the interest of the state, and as he was now Patell of his village, and had become a formidable person among the Kolies, he was placed in charge of the police of a district in the Konkan, under the impression that he could check the inroads of his Koly kinsmen above the ghauts into the

villages of the tract he had charge of. Bhauggrah proved himself a very able police officer. Some time after the Konkan was transferred by treaty to the British government, Bhauggrah waited upon the collector. This gentleman employed the Koly as a peon but subsequently advanced him to the situation of jemadar of police in one of the purgunnahs near the ghauts. The Koly jemadar received a bhaut rupee and a fowl annually from every village within his range. Some of them presented him with a little rice, and he was entitled to a sheep from every flock that passed through his district to the coast. A few years had only elapsed after the cession of the country, when our government issued orders prohibiting persons in the service of government receiving any presents or perquisites of office beyond their fixed salary. Unfortunately in many instances these orders interfered much in abrogating the long established usages of the country; the abolition of which if deemed necessary it would be advisable to effect in a more gradual manner. In fact the order was a distressing blow to many a man, for they considered their dignity and consequence not only seriously affected by their not being permitted to accept of that mark of respect which their predecessors and ancestors had always received, but their income was most materially affected by the prohibitory mandate. I recollect having some years ago estimated Ramjee Bhauggrah's loss on the above occasion at nearly two hundred rupees annually. The jemadar presented several petitions to the constituted authorities, begging that he might be allowed to retain the perquisites that had been withheld, as it has always been the custom of the country for persons employed as he was to receive such dues. Unluckily for him he appealed in vain, and being rather disgusted and mortified with the treatment he experienced, he asked for his discharge. There appeared to be very great objections to giving him leave to retire from the service, for he possessed great local knowledge, and was a most active and useful police officer. Six months leave of absence was very reluctantly granted to him, and he proceeded to his village; however he had no intention of returning to his duty, unless his pay was increased, or permission given to him to receive the perquisites that had been withheld. It was soon discovered that Bhauggrah's services could not conveniently be dispensed with; and a peon brought him a letter from the magistrate calling on him to return to his duty. He proceeded to the Konkan full of hope that his salary would be increased, or that he would be allowed to resume his dues; but after a lapse of many months he received no satisfactory answer to his petition. Bhauggrah became now extremely discontented, and was ready for any mischief. The better to understand subsequent events I must refer to the arrangement of affairs in the hilly country in the year 1818. In March of that year, the Koly Naiks and their followers, forming the

police of the Rajoor district, were taken into the British pay, but the Koly Naik Govindrow Khary, the hereditary havildar of the hill fort of Ruttungur, a very old man, declined entering into the British service, under the pretext that he was old and superannuated; though it is well known that he refused the offer of employment under the impression that the Peshwah's government would be soon re-established. The havildar had twelve of his kinsmen (sons, brothers and nephews) employed as sepoys under him on the fort, receiving pay from government, besides various perquisites from about sixty villages presented annually. The aggregate of their yearly pecuniary allowance was 1,230 rupees; in this sum was included the revenue of the small village of Bhandurdurra, amounting to 250 rupees annually, of which place the Kharies were the hereditary tenants. Most unluckily for these poor people, the havildar's refusal of service plunged them all into great and unexpected difficulties; as they no longer received any pay, and the revenue of the village was resumed by the British authorities. The Kharies were sadly mortified, and continued in utter despair. In the course of the following year they became more embarrassed in their pecuniary affairs, as the Rajoor Koolkurnies discovered that they (the Kharies) had been plotting, and some of them were disposed to join Narrain Row Holkur's gang, who were at the time (October 1819) plundering in the Nassik district. The rapacious and overbearing Koolkurnies extorted the sum of three hundred rupees from the Kharies on this occasion, and it is worthy of notice that the last instalment of the money was not paid until March 1828. In various parts of the country there were many persons suffering much distress and inconvenience from having lost their employment in the hill forts: however, the large establishment of regular but more especially of irregular troops in the pay of government, overawed the discontented and kept them in a state of subjection. Yet, as the troops decreased in number, the conduct of many of the unemployed and displaced soldiery, and that of the predatory classes, became more conspicuous and more daring. For a series of years the persevering exertions and enterprising spirit of the Poona Ramoossies were closely and most anxiously watched by all those people, and as the efforts of the Ramoossies were ultimately crowned with considerable success, notwithstanding they were guilty of the most atrocious and violent measures during the years 1825-26, and 27, all their crimes were pardoned, as it appeared from the information before government that they could not be put down. They were consequently taken into pay and employed as the local police of the hilly country, and some lands conferred on them. The Koly population unfortunately thought they could not do better than follow the example of Oomiah and his Ramoossies. Many consultations were held by the Koly Naiks on this subject.

Jemadar Ramjee Bhauggrah and the Kharies were the chief leaders; but the Koolkurnies of Rajoor were aiding and abetting in the plot; so were the police Naiks of Rajoor (for their pay and allowances were considerably reduced under our government, which rendered them extremely discontended). It was finally determined that the Khary family should send in a petition to government, claiming a restoration to their rights and employment, either in the police of the district or on the hill fort of Ruttungur; but they were of opinion that their petition would be more readily listened to, were it known that they were in arms, and had taken up their residence in the jungles when it was forwarded. Accordingly Kassybah Khary, the youngest son of the late havildar of Ruttungur, proceeded to the hills with several of his relatives and forwarded their petition to Ahmudnuggur. Kassybah Khary was joined in a few days by jemadar Ramjee Bhauggrah, who deserted from the Konkan with two of the Koly police men; this was in the latter end of the year 1828. In January 1829, I proceeded to the western ghauts, taking with me a small detachment of the police corps; for letters had been received by the magistrate, from the mamlutdars of the Akolla district, reporting that the inhabitants had become greatly alarmed, as several hundred Kolies had assembled in the hills, for the purpose evidently of plundering them.

Although the gang was chiefly composed of the people of the district, there being nearly one, two or three persons from every village, yet, for the first two days after we had entered the hills, no satisfactory information could be obtained respecting the insurgents. The Brahmun Koolkurnies of Rajoor and some of their friends strongly recommended that the troops might not be employed, and that the leaders of the gang should be assured that, if they refrained from plundering, and remained quiet, government would make some provision for them. Those Brahmuns further asserted that, if the troops attempted to follow, they would have no chance of overtaking them; and that, if the Kolies were once fired on, they would immediately begin to plunder and burn every village they approached; that when the troops neared them, they would plunge into the ravines covered with jungle, and, at the moment they imagined they had succeeded in surrounding them, they would shortly be seen passing over the summits of some of the highest hills. In fact they had settled that the sepoys could never penetrate the tangled thickets of brushwood, or pass along the rugged and difficult footpaths* they alone travelled by.

* They were much astonished the first time they saw a detachment of the police corps cross a range of hills by one of the most difficult tracks, and which was considered by them impassable to sepoys. The men on the above occasion were dressed every one after his own fashion, the only thing they were required to attend to was that they had abundance of ammunition, and to be careful of their muskets. This event tended much to depress the spirits of the Kolies, while the enthusiasm and confidence of the troops were proportionally increased.

As troops employed to suppress a disturbance in a hilly and jungly country, can seldom or never accomplish in a successful manner the duty they may be detached upon, unless they obtain the cordial co-operation of a portion of the inhabitants of the district, several smart and intelligent men of the police corps had been previously instructed to exert their best endeavours to gradually conciliate some of the Kolies, and to obtain from them the information we were so much in want of. These men had been frequently employed on similar duty and succeeded extremely well in the present instance.

Information on the following points was communicated to government. The number of the insurgents; the wish and hope of the population of the hilly tract that they might succeed in their object (obtaining service and additional pay from government); the strong nature of the country, and the very great advantage of acting promptly and with decision, at the same time employing an adequate and overwhelming body of troops. In the mean time little notice was taken of the Bund (the insurgents), a detachment having been merely advanced towards them for the purpose of gaining information, but with strict injunctions not to molest the Kolies, and not to mind any threatening messages sent by them. A proclamation was sent to the leaders of the Bund, telling them to disperse their followers and to present a petition to government respecting any grievances they had to complain of; but that no letters or petitions from them would be attended to while they continued in arms.

The names of nearly all the persons composing the Bund were now ascertained, also that of the relatives and friends of the chiefs and other Koly Naiks, and of the villages where they resided. The names of such persons, male and female, as were likely to assist the Bund with supplies, and communicate intelligence respecting the movement of the troops, were noted down; also a description of the most noted hiding places, and of the footpaths leading over the different ranges of hills; with an account of the spots where water was procurable, in ravines or beds of nullahs, and on the tops of hills. The detachment from Bhewndy was stationed at the bottom of the passes leading into the Konkan, and the other detachments that arrived from Mallygown, Ahmudnuggur and Poona, were posted in the situations considered most desirable for them to occupy, while lightly equipped parties were selected to be employed in constantly searching the haunts and lurking places of the Kolies.

The insurgents, a few days previous to the arrival of the troops, had begun to levy contributions from the inhabitants; they also plundered at different times three small villages; but all these irregular proceedings were soon put a stop to, and it became necessary for them to separate into small parties. The few Bheels that had joined them returned to their homes, and many of the Kolies fled to a distance; therefore, to ensure the capture of the chiefs and those that remained with them,

detachments, with a certain number of the inhabitants, were posted near the different tanks and pools of water in the hills. This arrangement greatly perplexed the Kolies, and, as many of the inhabitants espoused our cause very warmly, the two chiefs and upwards of eighty of their followers were captured in about two months, and marched to Ahmudnuggur. The early and successful termination of the service must be chiefly ascribed to the great zeal and unceasing exertions of all the officers and men engaged in the service, which was one of a most fatiguing and harassing nature.

One of the most enterprising characters, in the Bund of which I have just given a short account, was a Koly named Ramah Keerva. He was a stout and powerful man with an extremely fine figure and good features; of a very unsettled and daring spirit, and noted among the Kolies for excelling them all in agility. Keerva quitted the Bund when they began to be much pressed by the troops; he moved to the southward accompanied by about twenty-five men. He meditated on several occasions attacking some of the detachments when they appeared fatigued from searching the jungles. He had been for some ten or twelve years concerned in many robberies, and persuaded four or five of the Kolies who had quitted the late Bund to remain with him rather than return to their homes; they chiefly lived in some caves or recesses in the rocks, occasionally moving about the country and visiting their friends. As he had many acquaintances among the Bheels along the banks of the Pera and Godavery rivers, he sent two of his Koly friends to some of the Bheel Naiks, inviting them to join him, and to proceed on a plundering expedition into the Konkan. Early in the month of January 1830, about thirty Bheels joined Keerva, who had assembled an equal number of Kolies who were at the time in the hills south of Kotool. As the Kolies, &c. around Joonere and in the Ghorenahir quarter had been plundering both above and below the ghauts, detachments of regular troops were moving about to apprehend them. A few men of one of these detachments (of the 11th regiment), under a Naik, were encountered by Keerva's gang, at the small village of Mandwah in the hills south of Kotool; the party were called upon to ground their arms and surrender themselves prisoners; this they very properly declined doing, and were consequently attacked by the Bheels and Kolies. The sepoys occupied a very small temple, and managed to keep their assailants off for several hours, until a detachment in the vicinity came to their relief. Several of the sepoys were killed and wounded. Keerva proceeded with his gang into the Konkan, and attacked and plundered the village of Kinnoully, and afterwards divided the spoil amounting to 7,590 rupees, when they reached the ghauts, the greater portion of it having been given up to the Bheels. The Kolies separated and the Bheels returning to their homes, were pursued by a detachment of the 17th regiment N. I. under that very active and most zealous

officer, the late Captain Luyken. I have omitted to mention before that that portion of the hilly tract of country lying south of Hurrisschunder, forms the western boundary of the Poona district; while that part extending northward, from the same hill fort, forms the western boundary of the Ahmudnuggur district. Troops were out now in pursuit of the Bheels, Ramoossies and Kolies who had committed depradations in the latter part of 1829, and beginning of the year 1830. Many of the officers and men employed had been out the previous season, and had consequently become well acquainted with the inhabitants and the localities of the country. All were actuated by an unusual spirit of enthusiasm, and willingly underwent the fatigue and labour of this harassing duty. Although the services and exertions of all were so great, yet it would be very unjust to the memories of the late Lieutenants Lloyd and Forbes, the former of the 11th regiment and the latter of the 13th regiment, were I not to mention that they greatly contributed to the restoration of tranquillity in the hilly country. A number of prisoners were taken to Poona and Thannu; Ramah Keerva with several other notorious leaders and their followers were brought to Ahmudnuggur, where Keerva was executed. Some years previously, detachments from the Konkan had endeavoured to capture Keerva by surrounding him in his house at night, but he invariably contrived to escape; but as the havildar commanding one of these parties was the Koly Patell of a village near Kotool, Keerva set fire to his house by which he lost property worth several hundred rupees. As I have before noticed, this practice of retaliation is a common one among the Kolies, and I had soon an opportunity of making an effort to check such a system. Two nights after Ramah Keerva was seized, the house of the man who gave the information which led to his apprehension, was burnt, with the dwellings of four other persons; two of these were extremely poor, and one of them a widow. I therefore had the loss of each person valued as nearly as possible, and allotted to the two poorer persons three times the value of the house and grain that were destroyed; and to the other three double the amount of the property consumed by the fire; and instantly circulated a proclamation offering a reward of five hundred rupees for the apprehension of the incendiary, and announced to the people, at the same time, that it became the duty of the government authorities to afford protection to persons who suffered injury in their person or property for having rendered useful service to the state.

I shall close this memoir by mentioning that the inhabitants of the Kotool and Rajoor districts showed a very great desire to aid the troops in the service on which they were employed; and while acting independently, without any of our troops near, they seized a number of the Bund and brought them prisoners to camp.

Ahmudnuggur, *19th July* 1836.

IV.—*Statistical Observations on the Vurragherries, or Pulney Mountains.—By* Robert Wight, M. D. *Surgeon.*

(*Communicated by the Madras Government*).

The Vurragherries or, as they are now more frequently denominated, Pulney mountains, are situated at, and partly close the opening of the valley of Dindigul, having a direction from east to west. Their length in that direction, according to Captain Ward, who surveyed and drew up an elaborate memoir* regarding them, is fifty-four miles, with a medium breadth of fifteen; their superficial area being calculated at 798¼ square miles. The plain from which they rise, as measured at Davedanaputty within a few miles of their base, is about 1,100 feet above the level of the sea, and presents, a few feet (8 to 10) under the surface, a bed of kunkur, varying, in different places where it has been penetrated in digging wells, from ten to twenty feet in thickness, overlying a bed of mouldering gneiss which crumbles into soil as soon as exposed to the air. Permamallie their highest peak, at least so far as I had an opportunity of determining, is nearly 7,000 feet above the plain, or about 8,000 above the sea, and may be estimated from a variety of measurements which I made, to rise from 1,500 to 2,000 feet above the average level of the higher range of hill villages. This point, however, I was prevented determining accurately by circumstances which I could not control. The most elevated village, or hamlet rather, I saw, that of Sembaganoor, is above 5,500, and perhaps may be about 5,600 feet above the sea—all the others appear to be on a much lower level. These hills may, according to their degree of elevation, be divided into two zones or regions; the lower characterized by the abundance of arboreous vegetation or jungle, with which it is covered; the upper by the greater predominance of herbaceous or grassy vegetation. The jungle in the upper zone is confined to patches on the sides of the hills, and in the bottoms of the deep glens, or rather gullies, by which the ridges are separated. These ridges are generally rounded on the top, with at first gently sloping sides, which gradually become steeper as they descend, and near the bottom are in many places quite precipitous. The rocks of which they are composed, so far as my observation extends, are all stratified, even to the extreme peak of Permamallie, and there the strata are nearly if not quite vertical. The principal rock composing this immense mass is gneiss, interstratified with quartz rock and traversed by veins of felspar. In many places it is seen projecting above the surface firm and unaffected by the weather, but more generally it is decayed to a considerable depth; and

* This memoir will be published in our next number, accompanied by a map of the Hills.

in such places so completely disintegrated that it is reduced to a gritty clay, the grains of quartz only, still remaining unreduced by the action of the causes that have so completely altered the other component parts. The strata generally have a dip inclining to the south-west, but varying in degree in different parts of the hills. On the terrace of Vilputty it scarcely seems to exceed 45°, while on Permamallie it is nearly 90 degrees.

The village of Poombary stands near the edge of a terrace, commanding a view, in a north or N. N. E. direction, of a valley many miles in extent, the sides and upper limit of which are bounded by precipitous rocks, presenting the appearance of having been abruptly broken by the sudden sinking of the intermediate portion. Standing on the edge of that terrace, and looking at the rocks on either side, the strata are quite conformable on both, and with a dip towards the south, of apparently not more than 15 or 20 degrees.

This valley in its outlines and general features is I think one of the most remarkable I ever saw. Its sides are nearly straight, and are perfectly parallel, united by its upper boundary, which is equally precipitous, at nearly right angles; the hollow between, presenting the same irregularity of surface that the higher grounds on either side do. That valley, or, as it may more appropriately be denominated, strath, seems very extensively cultivated, terraced fields being visible on either side of a stream by which it is traversed as far as the eye can reach.

The grassy tops of the hills are covered with a coating of very black soil, resembling peat-earth, varying in thickness from a few inches to several feet. The sub-soil, where the black prevails, is a yellowish clay, in some places of an ochre colour, but generally of a darker shade. Some that I saw was stiff and plastic, probably well fitted for making bricks, but has not yet been sufficiently tried to determine that point. Near Poombary it is light coloured, and being used in the construction of the huts, gives them a very clean and neat appearance, when viewed from a distance, which is apt to make the beholder suppose the inhabitants much more highly civilized, and more cleanly in their habits, than a nearer approach tends to confirm. The soil, about the valleys under cultivation, seems light and loamy, of a reddish brown colour, and, where well managed, produces large crops of the very few articles which the natives seem to consider worth the trouble of careful cultivation.

The productions of the higher or grassy regions are few, and for the most part of inferior quality, not however as it seems to me from the sterility of the soil, but from bad husbandry; the grain fields being every where so over-run and choaked with weeds, that it appears quite impossible for good crops to be produced. Some fields of Tennay (*Panicum italicum*) however, which I saw were excellent, whether from the ground being previously better prepared, or from its growing so strong that it

choaked the weeds, I was unable to determine. Their fields of wheat, barley, and cumboo (a very inferior sort is in use), were all full of weeds, the crops thin, and the quality of the grain inferior in proportion. Garlic is the staple production, and is raised in great quantities. It is tended with much care, the fields are well ploughed and manured, and not a weed to be seen: the returns seem very great, and, judging from the size of the bulbs only, of excellent quality.

This fact is sufficient to prove the fitness of the soil for the production of grain of the first quality, if a little more care was bestowed on its culture. This they do not think it worth, because they say "we cannot sell it, and what is the use of taking so much trouble with what we have to eat ourselves." Owing to this neglect the wheat and barley are of the worst description, rice, from their own account of it, equally bad, but of it I saw none, and can form no opinion of my own.

Their cultivation, equally with that on the plains, is much influenced by the seasons, being successful or otherwise, according as they have rain. Captain Ward mentions, with due encomiums, the ingenuity with which artificial canals are conducted to irrigate their terraced fields; but these unfortunately can only be of use, so long as the streams from which they derive their supply of water continue to flow. It does not seem ever to have occurred to the constructors of these canals to form reservoirs in which to lay up a supply of water against a drought; though, so far as my unpractised eye in such matters enable me to judge, many might be formed at no great cost, and prove of the greatest value to the inhabitants. It is true, that, to form such substantial structures, might require more skill than they possess, and prove too expensive for the poverty-stricken natives; but, until some such contrivance is had recourse to, it must ever prove difficult to guard against scarcities, in a country where the deep slopes of the rock has so strong a tendency to drain off the moisture of the thin coating of soil with what it is covered. These droughts, indeed, to a greater or less extent, seem of frequent occurrence, because in all enquiries respecting the productiveness of the soil and supplies of food, the answer invariably commenced with the postulate—'if the rains are good, then we have good crops and plenty of food; if not we are not so well supplied.'

The natural productions of the country are sufficiently varied to give us reason to put a high estimate on its probable capabilities. In the course of about 15 days I collected little short of 500 species of plants, and without any attempt on my part to preserve specimens of all the plants in flower or fruit at this season; many being rejected merely because I was not in want of specimens. It did not in short occur to me at the time, which it has since, to compare the vegetable productions of these hills with the recorded ones of the country generally. This I greatly regret, as I think, were a somewhat perfect collection formed, it would be found to con-

tain a number of species amounting to from 3½ to 4 fifths of the whole peninsular flora, so far as we are yet acquainted with it, and to present a vast number of species peculiar to themselves. Among the European forms observed were two species of Ranunculus; two of Anemone; three of Clematis; two of Berberis; a new Parnassia; two of Drosera (sun dew); oneStellaria, and one Cerastium(chick-weed); a rose, very abundant; three or four kinds of rasps and brambles; one Potentilla; one Circæa (enchanters night shade); a tree allied to the Bilberry (Thibaudia); one Anagallis; two of Lysimachia, both allied to British species; the common dock, very abundant about the villages; and three kinds of rushes (Juncus), one very nearly allied to the common British rush. *(Juncus effusus.)* Among the truly tropical forms, a species of Magnolia, the first I believe thatha s been discovered in the peninsula, is the most interesting; the Rhododendron nobilis very abundant; a very large and handsome Ilex (holly), but without the thorny leaves of the European plant; a species of Gordonia, a tree resembling in its flowers the Camelia andtea plant; a very remarkable species of fig, with a climbing stem, bearing fruit of the size of large oranges, in clusters along the stems: besides many other interesting trees which I fear it would be tedious to mention. Four species of palms are met with on the higher regions, namely the sago palm (caryota urens), a wild areca palm, the *Bentinckia condupana*, and an alpine species of date. The grasses are very numerous, but the predominant tribe (Andropogineæ) are not those best suited for pasturage, being generally of a coarse nature and highly aromatic quality. Ferns, mosses, and lichens, abound: among which, the most conspicuous is a branching variety of the Tree-fern, (Alsophila) very common in thick jungles on moist banks of streams.

My residence was so short, and at such an unfavourable season of the year, that I am unable to speak from personal observation of their climate. The mean of 60 observations of the thermometer suspended in a house gives 63° Fahrenheit, as the mean temperature during 20 days at an elevation of 5,450 feet. From a register of this kind no very satisfactory conclusions can be drawn. Had the thermometer been suspended under a shade in the open air, the results, so far as they went, would have been more satisfactory, but unfortunately the plan was not adopted. The very unsettled state of the weather, which confined me to the house nearly ten out of the twenty days I was there, would however have rendered such a register of little use, from the limited period of observation. Captain Ward, whose longer residence on them gave him a better opportunity of observing the thermometer, does not once mention it in the course of his memoir.

The population of this extensive tract of alpine country appears, from a statement attached to the cutcherry copy of Captain Ward's memoir, to be 3,299. If that record is correct, there must have been a very rapid decline since that time: for, according to one furnished on my application, by the collector, and made up in 1836, it appears it is now

reduced to 1648 souls, an unaccountable falling off in so short a period, otherwise than by emigration, as there has been no remarkable sickness or scarcity to have swept away half the population.

Those who remain, appear a robust and healthy set of people, very active, and, I dare say, capable of great exertion if excited, but, like most people similarly situated, very indolent. They appear a simple race, having few wants, and these easily supplied. The principal part of their food is the produce of their own fields, while their clothing, agricultural implements, condiments and luxuries, are procured from the low country in exchange for their garlic; hence the care bestowed on its culture. Their food consists principally of rice, wheaten cakes, barley, and barley congee. Of animal food they seldom or never partake, and very rarely of curry, not from want of inclination, they say, but from want of means to get the materials. Their clothing is very sparing, considering the rigorous climate they inhabit. It consists of a cloth wrapped round their middle, and another thrown loosely over their shoulders, or used according to circumstances as a turband. The children, like those of the plains, are perfectly naked, which must be adverse to the extension of population, since the most robust only, can be expected to sustain uninjured, such rude exposure to the rough inclemencies of the weather that occur at the change of the monsoons, and during the cold winter season, when the thermometer is said to sink within a few degress of the freezing point, the puddles to freeze, and the grass to become covered with hoar frost.

Their huts are built of wicker work, plastered over with clay, and thatched with grass and ferns. They usually have a neat appearance outside, but are not remarkably cleanly within. The courts in front, and the streets of the villages, are frequently paved, but contaminated with accumulations of filth, too often of the most disgusting description. The spaces between the houses are usually overgrown with rank, and worse than useless, jungle, while they might be occupied either by trees that would afford health and shade, or by really useful ones, such as oranges; and, if measures are taken to ameliorate their condition, still better by some of the European fruits, such as apples and pears. Plums I believe would thrive equally well, and to these might be added coffee, as affording a produce of more intrinsic value than any of those already mentioned. I am not quite certain how far it would succeed on the higher zone, but it would unquestionably do so on the lower, and in a few years prove a valuable addition to the exports from the hills.

Their means of intercourse, not only with the plains but between the villages, are usually of the worst description; so that beasts of burden can rarely carry a load equalling that of an ordinary cooly on the plains; and the roads, bad as they are, usually deteriorate, as they approach the low country, from the ascent being steeper and more broken there than above, and the jungles thicker. To this cause much of the poverty of

the people is no doubt attributable, the cost of conveying their goods to market absorbing so large a proportion of their price that but little profit can come to the sellers.

The accompanying tables, one supposes to have been prepared about 1820, but without date, the other in 1836, show, that in these 16 years the population has diminished more than a half, I believe without any other assignable cause than emigration, induced by poverty and want naturally resulting from the obstacles to improvement inherent in the character of the country itself, when not only not counteracted by artificial means, but increased by the abstraction, in the form of taxes, of the small amount of capital which finds its way there.

Believing it to be the wish of government both to preserve, and to ameliorate the condition of, this interesting portion of the population, as well as to extend the benefits which may be expected to flow from the possession of a tract of country so large and centrically situated, enjoying a climate widely different from that by which it is surrounded, and fitted thereby for the production of so many articles not indigenous to India, but the possession of which might prove of great importance: I shall take the liberty of offering a few suggestions for its improvement, the result of my observations while there, which may, if considered worthy of adoption, be the means of restoring the moiety of the population it has lost, and tend to enhance the value of the district they inhabit to the country at large.

In attempting to ameliorate the condition of the hill population, two plans suggest themselves : the first and most obvious, and the one apparently most likely to produce a speedy effect is, to relieve the people of their taxes for a given number of years, until it is supposed they will have accumulated the means of paying them without inconvenience. This, however, is not the one which presents itself to me as the best. I object to such a plan, on the ground that what was first received as a boon might afterwards be claimed as a right, giving rise to much trouble and inconvenience in the re-establishment on the part of the sircar of his original rights, and causing heavy discontent among the inhabitants; while it is probable, the money so given would be squandered in place of being employed in the manner intended. I would further object to this plan, on the ground that no part of the money, so withdrawn from the treasury, would be devoted to the improvement of the country and roads, the object, of all others, most wanted. A third objection is, that it might prove a premium to emigration from the plains, causing a further loss to the state of the labour of the emigrants in a tax-paying district. Opposed as it is, by such weighty objections, this plan cannot be entertained for a moment. The second is, to devote the revenue of the hills to their improvement, by which much good may in a few years be accomplished at a very small cost; and that

drawn so imperceptibly from the general treasury, that it would not be felt; at the same time that it would give universal satisfaction to the payers, when they saw their contributions to the state applied for their personal benefit. Unless some such measure is adopted, there is much reason to fear the total depopulation of the hills by emigration alone. At present the aggregate amount of taxes raised from them is only about 3,300 rupees per annum: that sum, carefully applied, would, in a few years, repair the now almost impassable roads, establish completely the present imperfect, but very useful and much trodden, communication between Davadenaputty and Periacollum on the south, and Pulney on the north, by clearing the paths of innumerable impediments which now obstruct them, and opening freely, the very close and unhealthy jungles at the foot of the hills near the latter place. Sheds, for the accommodation of merchants and the preservation of their goods, might be erected at convenient distances along these roads, and public choultries at each of the large villages, in which they could bivouac during their stay, collect their garlic, &c. and make their bargains; and, lastly, when these more immediate wants were cared for, bunds might be built, in the most convenient situations for preserving supplies of water against droughts.

Improving the access would at the same time lower the cost of imports, and increase to the growers the value of exports, by diminishing the cost of bringing them respectively into market, while the formation of reservoirs of water would ensure more certain returns to the agriculturist. While on the hills, I had a quantity of Jumlah or Himalayan rice sown, for trial; if the experiment proves successful it may become a valuable article of export, being of good quality, which the kind now in use is said not to be. It seems further desirable to change the wheat and barley seed; that now in use having become deteriorated by long culture on the same ground. This the ryots might receive in a present, as a very small quantity of each would be sufficient to supply the whole cultivation. But it should be given on the express condition of more attention to good husbandry being bestowed on its culture than is now the practice: by which wheat fit for exportation might be grown, and would prove a great accommodation to the inhabitants of both the high and low countries.

The inhabitants, though in the extreme of poverty, are, notwithstanding, exceedingly indolent, from having no very pressing wants to stimulate them to exertion: it appears therefore indispensable, as the first step towards improving their condition, to afford them such a stimulus, by creating artificial wants. This I think may be easily accomplished by opening a few shops in some of the large villages, containing an assortment of agricultural inplements, hatchets, knives, bill-hooks, cloth, female ornaments, condiments, &c. The same necessity that now induces them

to exert their ingenuity to do without things they want, but have few or no opportunities of procuring even at a high price, will stimulate them to exertion to procure the means of purchasing things daily before their eyes, and of the uses and value of which they are by no means ignorant. When they know that a few measures of good clean wheat or barley will purchase them a hatchet or a cloth, as certainly as so many heads of garlic, they will soon see the advantage of bestowing equal care on the culture of the one, as is now given to that of the other: and, when the facilities for carrying their produce to market are increased by means of improved roads, they will take care that the merchants, now in the habit of trading on the hills and fixing their own prices, give them proper value in exchange, as they can if refused take it themselves to the low country markets. It may, in the first instance, be necessary to give a premium for the establishment of shops, but this cannot be long required.

Should these suggestions be thought worthy of adoption, either wholly or in part, it may be necessary, to ensure the careful appropriation of the funds to proper objects, to order the collector or his immediate subordinate to inspect the works in progress at least twice a year, and to pay more transitory visits, at any time his other duties may call him to the neighbourhood. And should they happily prove useful in paving the way to future prosperity and increase of the population, by giving a stimulus to exertion, it may, after the first two or three years, be proper to carry any excess of revenue that results to the credit of the state: since these objects will be much better accomplished by a slow, than speedy process, which will allow time for the habits and dispositions of the people to undergo the changes necessary to enable them to keep pace with the improvement of their country. Another great improvement it appears to me would be, as already hinted, the introduction among them of the coffee plant, by which the present rank unwholesome and useless vegetation, with which their villages are choaked, would be superseded, and a substitute of great intrinsic value made to take its place. Such a proceeding was adopted a few years ago in the Kandy country by Sir E. Barnes, and has so completely succeeded, that already every cottage has its coffee inclosure, and coffee shops have become common along all the principal roads, at which it is as much the custom of coolies carrying loads to stop and drink coffee, when fatigued, as elsewhere it is their habit to partake of the pernicious contents of the toddy shop. On the upper region sugar could scarcely be expected to prove a lucrative crop, at least for some years, but it appears to me it might be tried with every hope of success on the lower valleys, and, should it succeed, would prove an article of great value.

CHANASHOOMAREE TABLE OF THE VURRAGHERRY AND KUNNANDAVAN MOUNTAINS.

	Karakat Vellalers.	Kunavar Vellalers.	Kykallers.	Vellam Chettys.	Kongu Chettys.	Tellunga Chettys.	Murrawars.	Kamplears.	Tottyars.	Wuddagars.	Osleakauren.	Vullayen.	Kavaray.	Andeys.	Artificers.	Washermen.	Barbers.	Lubbays.	Chucklers.	Pelian.	Number of castes.	Males.	Females.	Total population.	
Palatoor.......... Tandygoody...... }	0	50	0	0	42	0	0	0	0	2	9	87	0	0	38	9	9	0	15	57	10	161	157	318	Perriacolum or Tenkurry talook.
Munnaloor........ Punnymullay. .... }	0	72	0	39	0	0	0	0	0	0	0	0	0	0	68	1	2	0	2	40	7	114	110	224	Nullacotta talook.
Pautchoor .... .. Perryur.......... }	0	247	0	20	9	60	0	16	4	0	7	12	0	0	41	5	6	0	9	124	13	295	265	560	Veerapautchy.
Kawinjee..........	0	237	0	4	0	0	0	0	0	0	0	0	15	5	5	7	7	0	2	0	8	129	153	282	Ayagoody.
Poomburra including Velputty.... }	0	207	289	80	0	0	151	0	0	17	0	0	0	0	59	53	17	0	33	10	10	469	447	916	} Jampollum.
Munnamanoor......	0	284	243	141	0	0	0	0	0	0	0	0	0	0	194	4	54	0	47	32	8	503	496	999	
	0	1097	532	284	51	60	151	16	4	19	16	99	15	5	405	79	95	0	108	263	18	1671	1628	3299	
Nachyvile..........	327	38	0	0	95	13	0	0	0	0	0	0	0	0	17	0	8	13	3	133	9	288	359	647	Anjeenad Travancore.

DASAJADDA TABLE OF THE VURRAGHERRY AND KUNNANDAVAN MOUNTAINS.

Names of the principal Villages.	Villages.					Religious Establishment.			Number of ploughs.	Cattle.						Number of Houses.	On what district dependent.
	Principal.	Subordinate.	Ruined.	Total.		Vistnoo.	Sheven.	Sundry petty temples.		Oxen.	Cows.	Buffaloes.	Sheep and goats.				
Palatoor Tandygoody	4	1	0	5	0	2	2	25	30	52	70	71	0	0	0	117	Perriacolum or Tenkurry talook.
Munnaloor Punny mullay	4	8	0	12	0	8	0	1	25	30	50	42	0	0	0	86	Nullacotta talook.
Pautcheloor Perryur	2	4	0	6	0	3	3	18	68	137	145	112	0	0	0	119	Veerapautchy.
Kawinjee	3	0	0	3	0	0	4	0	21	84	86	0	0	0	0	68	Ayagoody.
Poomburra including Velputty	2	4	1	6	0	0	11	51	215	431	400	52	0	0	0	235	Jampollum.
Munnamanoor	1	7	2	8	0	6	10	43	142½	285	402	55	0	0	0	211	Jampollum.
	16	24	3	40	0	11	30	138	501½	1019	1153	332	0	0	0	836	
Nachyvile	6	5	0	11	0	2	1	8	94	155	259	105	0	0	0	183	Anjeenad Travancore.

V.—*Further Observations regarding the Homöothermal method of Acclimating Extra-Tropical Plants within the Tropics.*—By ROBERT WIGHT, Esq. M. D. &c. &c.

It will be recollected that the Homoöthermal method of acclimating, rests on the supposition, that plants raised from seeds, sprouted under a high temperature, have their constitutions so modified as to fit them for successful culture in higher temperatures,* than if raised in the usual manner under shade. In the following remarks, I shall offer some further elucidations of the method, and propose some experiments, which will go far, I think, either to refute the argument, or to establish the plan on a firm foundation.

I have recently met with two papers bearing indirectly on the subject; to give some account of which and show their application to practice, are my reasons for now resuming its consideration. The first of these is a letter from N. B. Ward, Esq. of London, to Dr. Hooker, published in the *Companion* to the *Botanical Magazine*, vol. 1st, page 317, —"On an improved method of transporting living plants;"† the other a memoir, by Messrs. Milne, Edwards and Colin—"Sur la vegetation des Cereales sous de hautes temperatures." Mr. Ward informs us that the simple incident of burying the chrysalis of a sphynx in some moist mould, contained in a wide-mouthed glass bottle, lightly covered, led him to the discovery, that earth so situated was always equally moist

* Since this paper was sent to the press, I have met with the following very apposite fact in support of the principle, and strongly corroborative of the method of acclimating, advocated in my former paper.—"I remarked that in coffee-plantations the nurseries are formed not so much by collecting together those young plants which accidentally rise under the trees that have yielded a crop, as by exposing the seeds to germination during fine days in heaps between plantain leaves. These seeds are taken out of the pulp, but yet retaining part of it adhering to them. When this seed has germinated, it is sown, and produces plants that can bear the ardour of the sun better than those that spring up in the shade in the coffee-plantations."—*Humboldt's Personal Narative, Eng. Edit.* 4, *pages* 67, 68.

The heat developed by the fermentation of the adherent pulp, seems in this case to cause the rapid germination here mentioned, and to produce the constitutional change on the plants which enables them to "resist the ardour of the sun better than those that spring up in the shade." More conclusive evidence of the truth of the principle explained could scarcely, in my opinion, be adduced.

† Republished among the "*Selections*," at the end of this Number. The British Association for the Advancement of Science has considered this subject of importance sufficient to induce them to offer a premium for experimental researches regarding it.—*Editor.*

by the condensation on the sides of the bottle, and return of the moisture, which evaporated during the heat of the day; and that plants, growing in mould so preserved, would live for months or years without any additional supply of water. He was thence induced to extend his experiments, and in the course of them ascertained that, so protected, the most delicate plants, and from stations enjoying the purest air, continued for years to thrive in the pre-eminently impure atmosphere of London; and that they remained nearly unaffected by change of temperature, tropical and arctic plants, so isolated, growing freely in the same case.

The application of this last fact to the introduction of tropical plants into England was too evident to be long overlooked. He says, " reflecting on the causes of the failure attending such conveyance (of plants on long voyages), arising chiefly from deficiency or redundancy of water, from the spray of the sea, or from want of light in protecting them from the spray, it was of course evident that my new method offered a ready means of obviating all these difficulties, and in the beginning of June 1833, I filled two cases with ferns, grasses, &c., and sent them to Sidney." There they all arrived in safety, though the glazed cases by which they were covered were not once, or only once, opened on the voyage. " The English plants were removed, and the cases refilled at Sidney in the month of February 1834, the thermometer ranging between 90 and 100°."

" In their passage to England they encountered very varying temperatures; the thermometer fell to 20° in rounding Cape Horn, and the decks were covered a foot deep with snow. In crossing the line, the thermometer rose to 120°, and fell to 40°, on their arrival in the British channel in the beginning of November, eight months after they were enclosed. These plants were not once watered during their voyage, received no additional protection by day or by night, and were taken out at Loddiges' in the most healthy condition." Since then numerous cases of plants have been sent to various tropical countries, and others returned with equal success. It is now the practice to send annually numerous cases of plants so protected from the Calcutta botanic garden to England, the glass cases of which, are not once opened during the voyage; the only precaution required, being to place them in such a situation as to afford them the greatest quantity of light.

My object in recapitulating so much of this paper, is to show the application of it to the determination of the value of my suggestions for acclimating plants. In the hot houses of England, where the temperature is kept up to the tropical standard, the seeds of fruit and timber trees might be germinated, and the young plants sent to this country for introduction, along with others (for the sake of comparison) germinated in the usual way.

If the premises, on which my views are grounded are correct, plants so prepared should be not only endowed with the power of resisting high temperature, but should produce seeds endowed with similar properties, and become the means of greatly extending our catalogue of useful plants: nor need the use of glazed cases be confined to the introduction of extra-tropical plants; those from other tropical countries might in like manner be introduced with certainty, and without loss or accidents on the voyage, from bad weather, exposure to sea spray, changes of temperature, &c. and could be kept in safety after landing, till a favourable season arrived for transplanting them; or, should it be desirable or necessary to send them into the interior, the continued protection would be equally effective for their preservation. On this part of the subject I believe it is quite unnecessary to say more, as the application must be obvious to every one.

The cases consist of a box, the joinings of which are made water tight, to retain the moisture of the earth. To this a glazed frame is fitted, so close as just to go easily within the box. The frame ought to be about 18 inches or two feet high. The soil being then well moistened and the plants introduced, the glazed frame is fitted on, after which nothing further is required. Mr. Ward observes—" It may be as well to state once for all, that the success of my plan is in exact proportion to the admission of light to all parts of the growing plants, and to the due regulation of the humidity of the mould, wherein they grow. It is safer in all instances to give rather too little than too much water. Plants frequenting a humid soil require more water, while fleshy succulent plants are best preserved, planted in dry sand."

The French memoir has for its object the determination of a point of the highest importance to the tropical agriculturist, and one, which it is surprising has not hitherto been investigated with the care which it obviously merits, namely the highest temperature at which the more common European Cerealiæ can be cultivated with success; and, so far as it goes, is one of great value. Reasoning from insufficient data, I was led to infer, that seeds, sprouted in a high heat, would produce plants capable of successfully resisting temperature, much higher than those to which they are generally exposed in the usual course of cultivation, and that in this way extra-tropical plants might, so to speak, be tropicalized. The experiments of the French philosophers unfortunately do not bear on this point, but as it seems desirable that the result, as well as their deductions, should be known among us, I shall give a brief summary of them, and then show the points in which they appear to me defective, in the hope that the ingenious authors may be induced to repeat them, with such modifications as may tend to confirm or refute my views.

The authors, having shown, in a previous memoir, that the germination of the seeds of both monocotyledonous and dicotyledonous plants was not prevented, other circumstances being favourable, by exposure to a temperature of 112° Fahrenheit, were led to enquire whether the more common European Cerealiæ (edible corn) might not be cultivated successfully in the very warm climates. On this point they found great discrepancy of opinion between practical agriculturists equally, conversant with the history and practice of agriculture, and scientific travellers who had visited such climates: the former, maintaining their belief that they might be successfully cultivated in all hot countries; the latter, denying, from actual observation, that they would succeed generally in tropical climates. To determine this point, samples of the two principal varieties of wheat in common use in France, the *winter* and *spring* varieties, were sown side by side on the 23d April, in a piece of well prepared ground, the increasing heat of the season being then very decided. Both germinated alike, and for some time advanced equally. By and bye the heat increased, and a remarkable difference became evident; for, while the spring wheat continued erect, its stems elongating and advancing in the usual manner to ear, those of the winter wheat ceased to increase in length, began to decline from the erect position, and the short stems became hid in tufts of large leaves; in a word it remained *en herbe.* In this form they continue to vegetate vigorously, producing numerous short stems, and large succulent leaves, forming together a beautiful green plot. The spring variety arrived at maturity at the usual time; when the change in the winter wheat commenced, the heat had risen to about 66° Faht.; whence the authors infer that this variety is incapable of arriving at maturity in any country, the mean temperature of which exceeds 65° Faht. The next experiment seems strongly corroborative of this deduction. A fresh portion of spring wheat was sown in July, when the mean temperature had risen to 71 Faht., and underwent the same changes that the winter wheat sown in spring had previously done; that is the stems ceased to elongate, became oblique and depressed, and were enveloped in tufts of large leaves, simulating luxuriant pasture or turf. Hence it is further inferred, that the spring variety can only be cultivated successfully in a climate the mean temperature of which is under 71° Faht. In confirmation of these deductions from experiment, the following facts are cited from the works of Boussingault and Humboldt. The former of these travellers states that, in the whole of the zone embracing the foot of the Andes, from the level of the sea to the height of 1721 metres (nearly 6500 feet), he neither found wheat nor barley, but, immediately above, he entered a broad zone presenting abundance of thriving corn. The first of these zones has for its infe-

rior limit a medium temperature of 25° cent. (77° Faht.), and at its superior boundary a mean heat of 18. 8 cent. (66 Faht.) : it therefore has a higher temperature than that at which the inhabitants can successfully cultivate these grains ; a result according accurately with the deductions from experiment. Humboldt remarks that the temperate region of all climates, where the mean annual heat is between 18 and 19° cent. appears the most favourable for the culture of the Cerealiæ ; that in the equinoctial part of Mexico the European Cerealiæ are not cultivated on any part of the table-land, under an elevation of 8 or 900 metres (say in round numbers 2600 and 3000 feet) ; and on the slopes of the Cordilliceras, between Vera Cruz and Acapulco, he had rarely seen that kind of cultivation commence under an elevation of 12 or 13 hundred metres. That long experience had proved to the inhabitants of Xalapa that wheat, sown about that town, vegetates vigorously, but does not shoot upwards into ear ; on which account it is cultivated as pasture and forage for cattle : but that, in the province of Guatimala, though much nearer the equator, and at a lower elevation, European corn ripens ; perhaps owing to some local cause modifying the influence of the climate. He further informs us that he has seen, in the province of Caraccas near Victoria (latitude 10° 13'), the most beautiful fields of wheat, at an elevation of from 17 to 19 hundred *feet* ; that the corn fields of the isle of Cuba (lat. 21. 58) have even a less elevation than that ; and in the Isle of France (lat. 20° 10') wheat is cultivated almost at the level of the sea.

These last statements seem so greatly at variance with the facts previously enumerated and the deductions from them, that it is difficult to conceive how they can be reconciled, or reduced to any general principle, otherwise than by assuming that culture can produce varieties suited to different climates. Would the Victoria, Cuba, and Mauritius varieties of wheat succeed in France, if sown during the summer season, or in circumstances similar to those in which the winter and spring varieties of that country had failed ? I think they would. The cultivation of wheat in this country affords an additional proof in support of this view, and the recent presentation at the meeting of the Madras Agricultural Society of well filled ears of the Victoria variety of wheat, and also of barley and oats, all grown in a mean temperature of about 75°, confirms it; since all the European varieties of the same kinds of grain failed in France, under a mean temperature not exceeding 71 degrees.

Perhaps these differences may be more satisfactorily accounted for on the principles explained in my former paper, and even the cause of the production of varieties shown. Thus it was observed, in the course of the experiments in France, that the growth in a normal form,

of all the kinds and varieties of European corn subjected to experiment, was prevented by the high temperature of July (71° F.); but that, on the heat afterwards subsiding in August (to what degree is not mentioned), they all shot out fresh erect stems, and many of them produced ears, though, owing to the advanced season of the year, none matured its crop. It was also observed that the winter wheat died down to the root in winter, but not the root itself, and on the return of spring produced a luxuriant crop, which ripened in the usual way. In India we sow in October and November to reap in February and March, (Victoria wheat is quicker, requiring only about 100 or 110 days for maturation): the mean temperature for these months is for October 82°, November 78° 9', December 76°, January 75.5, February 77° 7'. Supposing the seed sown in October, after the setting in of the rains, under a temperature of 82° (11 degrees higher than that of Paris in July), the progressive diminution of heat, during its after stages, enables it to advance uninterruptedly until the increasing heat of February brings it to maturity; whereas, if sown in December or January, when the heat is at its minimum, the result of the Paris experiment gives us every reason to suppose that the rise of temperature in February would arrest its progress, in the same way as happened in France; and there is equal reason to infer, if the failure in Xalapa is justly attributed to the heat, that the adoption of a similar modification of the method of culture would enable them to raise grain in place of merely pasture crops, and at the same time supply themselves with a variety of grain suited for successful culture in their climate. This view, which seems fully in accordance with the experience acquired in tropical climates, is at variance with some points of that obtained in temperate ones. Thus it is recorded in the memoir that winter wheat, sown in March, when the temperature was 6 degs. 5m. centigrade (about 44° Fah., a temperature too low for germination), which did not germinate till the heat had risen 3 degrees, yet continued, notwithstanding a rapidly increasing temperature, steadily to advance to maturity. These cases seem so diametrically opposed as to be inexplicable on any known principle, and can only be accounted for on the supposition that art can change the course of nature, in so far at least as is manifested in these vital operations of plants. According to the laws of vitality explained in my former communication, we might perhaps say that the winter variety requires a very high *comparative* degree of heat, to supply which it is necessary, in the first instance to increase its susceptibility for that stimulus by exposure to cold; and that the other has had its constitution so modified that the opposite condition has been established, and that it, therefore, requires to have its susceptibility diminished by previous exposure to a higher temperature

than that in which it is to grow (the very change which it is the object of the Homöothermal method to produce), to prepare it for culture in a tropical climate, by rendering it so very susceptible of cold, that a slight reduction of temperature is sufficient to counteract the injurious tendency of excessive heat. According to this view it is desirable that the authors of the memoir should extend and vary their experiments, so as to determine this point, and prove the existence of the modifying principle I have supposed. This, with the experience derived from their former experiments, might now perhaps be more easily accomplished than it could have been previously. They have ascertained that winter wheat, sprouted under a temperature of 19° centigrade, and exposed to temperatures progressively increasing to 22, did not succeed; let them now sprout the same variety in a heat of 23 or 25°, and after it has ceased to grow erect, expose it to the highest summer heat of France (22), that at which all varieties of grain yet tried had failed, and see whether it will then throw out new fruitful shoots, as the others had done on the reduction of temperature; and, in the event of its perfecting its seeds, to ascertain whether they can successfully contend with such a temperature as arrested the progress of the parent stock. Until some such course as that here suggested is adopted, the experiments hitherto made can be of no value to agriculture, opposed as they are by unlimited experience in warm climates. Humboldt who had no such theory to support, and who therefore simply states the facts as either known to himself or recorded by others, writes as follows.

" The environs of La Victoria present a very remarkable aspect, with regard to agriculture. The height of the cultivated ground is from two hundred and seventy to three hundred toises above the level of the ocean, and yet we there find fields of corn mingled with plantations of sugar-canes, coffee, and plantains. Excepting the interior of the island of Cuba,* we scarcely find any where else in the equinoctial regions European corn cultivated in large quantities in so low a region. The fine fields of wheat in Mexico are between six hundred and twelve hundred toises of absolute elevation; and it is rare to see them descend to four hundred toises. We shall soon perceive, that the produce of grain augments sensibly, from high latitudes toward the equator, with the mean temperature of the climate, in comparing spots of different elevations. The success of agriculture depends on the dryness of the air; on the rains distributed among different seasons, or accumulated in one rainy season; on winds blowing constantly from the east, or bringing the cold air of the north into very low latitudes, as in the gulf of Mexico; on mists, which for whole months diminish the intensity of the solar rays; in short, on a thousand local circumstances, which have

* The district of Quatro Villas.

less influence on the mean temperature of the whole year, than on the distribution of the same quantity of heat among the different parts of the year. It is a striking spectacle, to see the grain of Europe cultivated from the equator as far as Lapland, in the latitude of 69°, in regions where the mean heat is from 22° to 2° in every place where the temperature of summer is above 9° or 10°. We know the minimum of heat requisite to ripen wheat, barley, and oats; we are less certain in respect to the maximum, which these species of grain, accommodating as they are, can support. We are even ignorant of all the circumstances, which favour the culture of corn between the tropics at very small heights. La Victoria and the neighbouring village of San Matheo yield an annual produce of four thousand quintals of wheat. It is sown in the month of December, and the harvest is reaped on the seventieth or seventy-fifth day. The grain is large, white, and abounding in gluten: its pellicle is thinner and not so hard as that of the wheat of the very cold table-lands of Mexico. An acre near Victoria generally yields from three thousand to three thousand two hundred pounds weight of wheat. The average produce is consequently here, as at Buenos Ayres, three or four times as much as that of northern countries. Nearly sixteen times the quantity of the seed is reaped; while, according to Lavoisier, the surface of France yields on a mean only five or six for one; or from one thousand to twelve hundred pounds per acre. Notwithstanding this fecundity of the soil, and this happy influence of the climate, the culture of the sugar-cane is more productive in the valleys of Aragua, than that of corn.

"Near San Matheo we find the last fields of wheat, and the last mills with horizontal hydraulic wheels. A harvest of twenty for one was expected: and, as if the produce were but moderate, I was asked, whether corn produced more in Prussia and in Poland. It is an error that generally prevails under the tropics, to consider grain as plants which degenerate in advancing toward the equator; and to believe, that the harvests are more abundant in the northern climates. Since calculations have been made on the progress of agriculture in the different zones, and the temperatures under the influence of which corn will flourish, it has been found, that, beyond the latitude of 45° the produce of wheat is no where so considerable, as on the northern coasts of Africa, and on the table-lands of New Grenada, Peru, and Mexico. Without comparing the mean temperature of the whole year, but only the mean temperature of the season which embraces the *cycle of vegetation* of corn, we find for three months of summer, in the north of Europe, from 15° to 19°; in Barbary, and in Egypt, from 27° to 29°; within the tropics, between fourteen and six hundred toises of height, from 14° to 25.5° of the centigrade thermometer.

"The fine harvests of Egypt and of the kingdom of Algiers, those of the valleys of Aragua and the interior of the island of Cuba, sufficiently prove, that the *augmentation of heat is not prejudicial to the harvest of wheat and other alimentary grain*,* unless it is attended with an excess of drought or moisture. To this circumstance no doubt we must attribute the apparent anomalies, that are sometimes observed between the tropics, in the *inferior limit of corn*. We are astonished to see to the east of the Havanah, in the famous district of Quatro Villas, this limit descend almost to the level of the ocean; while to the west of the Havanah, on the slope of the mountains of Mexico and Xalapa, at six hundred and seventy-seven toises of height, the luxury of vegetation is such, that wheat does not form ears.† At the beginning of the conquest, the corn of Europe was cultivated with success in several regions, which are now thought too hot, or too damp, for this branch of agriculture. The Spaniards recently removed to America were less accustomed to live on maize; they still adhered to their European customs; they did not calculate whether corn would be less profitable than coffee or cotton; they tried seeds of every kind; they interrogated nature with more boldness, because their reasonings were less founded on false theories. The province of Carthagena, crossed by the chain of the mountains Maria and Guamoco, produced wheat till the sixteenth century. In the province of Caraccas, this culture is very ancient among the mountainous lands of Tocuyo, Quibor, and Barquisimeto, which connect the littoral chain with the *Sierra Nevada* of Merida. It is still happily practised there, and the environs of the town of Tocuyo alone export annually more than eight thousand quintals of excellent flour."

It does not appear, from these extracts, that high temperature is such an insurmountable obstacle to the successful culture of the *Cerealiæ*, as the authors of the memoir would lead us to believe. They seem indeed to have been so captivated with the simplicity and conclusiveness of their theory, that they have disregarded many old and well known facts opposed to their conclusions. Still it is not too late; the same ingenuity that suggested their first very simple and beautiful series of experiments, might with equal facility indicate others leading to still more important results, by showing how we may be able to sub-

* This passage seems very strongly opposed to the deductions of Messrs. Edwards and Colin, but cannot be considered as invalidating their accuracy until supported by comparative statements of temperature at the time of sowing in the respective countries.

† Whether is this explanation of the non-production of ears, or that of Edwards, the true one? I myself feel inclined to adopt the latter as being the more probable of the two.

ject to our control, and at will modify according to our wants, the operations of those principles of vitality, with which nature has endowed plants for the perservation of the vegetable kingdom.

Before concluding these remarks, I will briefly advert to another subject of very great importance to Indian agriculture. Humboldt states that the inhabitants of Xalapa cultivate wheat, not for its grain, because there it does not rise into ear, but for its forage and pasture. The authors of the memoir inform us, that, sown in too high a temperature, the *Cerelia* do not produce stems, and rise to flower, but remain in the form of grass (*en herbe*), forming a beautiful rich turf, but that afterwards, on the diminution of temperature, they shoot afresh and produce grain crops. They further inform us that, in some parts of the south of France, especially in the delta of the Rhone, it is the practice to sow early barley in autumn, for their cattle in winter, and usually it gives abundance of pasture during that season, and with the requisite care afterwards, a crop of grain. Hence, they add, if it is judged advisable, we may take two crops from the same seeds, one of forage for cattle, the other of grain for man, and both of superior quality. In the Carnatic the greatest difficulty the agriculturist has to contend with, is the want of forage for his cattle during the hot season, constraining him to use cattle of very inferior quality and unequal to his work, merely because more easily fed. Might we not, by following the example of the Xalapeans and Provinceans, supply ourselves as they do with abundance of the finest pasture and hay? I think we might—and by a very simple process—so simple, I believe it will be acknowledged by all, that it ought to be carefully tried. The subject is indeed well deserving the attention of all our agricultural societies, but more especially of our own, when the want of provender is annually so severely felt by the poorer ryots. The plan that I would propose for making the trial would be to sow wheat and other grains towards the end of the monsoon in December and January. If the statements and deductions of Messrs. Milne-Edwards and Colin are correct, the resulting crop ought not in the first instance to rise to stem and ear, but should form a rich pasture, the produce of which might be cut for hay or used for grazing during the whole of the hot season, the roots all the time extending and strengthening themselves for the final effort which is to close their existence, that of producing a crop of grain during the ensuing cool season.

As first experiments often fail, from the intervention of unforeseen circumstances difficult to prevent or even to detect in the first instance, I would recommend trials to be commenced as soon as possible, and repeated monthly, or at all events during the continuance of the petty monsoon and towards the close of the year. I have now sown two

small patches with wheat and barley, but feel rather uncertain about the quality of the seed; should they however germinate, I may possibly be able to estimate the probable result before the publication of this paper, in which case it will be communicated as a postscript. I am the more anxious to see this extensively tried, as success would at a moderate computation nearly double the value of land; first by the augmented return from it, and next by the means which it would afford of providing for a greatly improved breed of cattle. The improvement of our cattle is indeed daily becoming an object of greater importance, now that our internal commerce is increasing, and there is a prospect of our soon being able to bring into use the English plough, the economical employment of which, as an agricultural implement, must greatly depend on our ability to provide it with suitable draught cattle.

VI.—*On two new Genera of Rasorial Birds.*—*By* B. H. Hodgson, Esq. *British Resident in Nipal.*

If a tythe of the attention which has been bestowed on the Insessorial, had been given to the game, birds, we should not now be obliged to wade through huge tomes in which the habits and manners of the latter are wholly overlooked, and their forms most vaguely discriminated, whilst all the stress of description is laid on colours!

In the absence of any competent guidance as to the affinities of the Tetraonidæ, I cannot speak satisfactorily of the relations of the two birds, I am about to describe, both of which are distinguished by remarkable peculiarities of form and habits, giving them a very decided, but osculant character.

Order—Rasores.
Family—Tetraonidæ.
Sub-family—Perdicinæ *nobis.*
Genus—Lerwa *nobis.*

Bill shorter than the head, very strong, conspicuously arched throughout; the upper mandible greatly larger than the lower, and nearly concealing it. Nostrils small, opened subvertically towards the head, and closed in front and above by a very tumid, small, hard scale.

Intire head and base of the bill closely plumed. Plumage of the body very abundant, firm, and somewhat puffy and spinous on the croup. Wings and tail ample and strong. Wings ungradated: four first quills subequal: second, usually the longest of all. Tail 14,

straight, rounded. Legs and feet rather small. Tarsi plumed below the blunt small spurs. Acrotarsus reticulo-scutellate. Lateral fore toes subequal; hind perfect; the fores pectinated to the sides.

Habitat—The Himalayan region, in the immediate vicinity of the perpetual snow. Habits, gregarious in coveys; never perches; feeds on aromatic buds and leaves, on roots, insects and seeds. Trachæa simple. Intestines and cæca approaching the length in the grouse.*

Type, Perdix Lerwa nobis. Proceedings of the Zool. Society of London, September 1833. Lerwa Nivicola nobis. Affinity equal with Perdix and with Tetrao, leading from the one to the other.

Structure and size. 15 inches long by 24 in expanse of wings; bill $\frac{15}{16}$; tail 5; tarsus less 2; central toe $1\frac{6}{16}$; hind $\frac{7}{16}$; weight $1\frac{1}{4}$ to $1\frac{1}{2}$ lbs. Bill to head as 15 to 22, very stout, hard and uncompressed: maxilla not much rounded on the culmen, but spreading on the sides, and so much longer and larger than the mandibula as nearly to conceal it. Tomiæ somewhat scarpt and trenchant. Nares small, opened vertically towards the head, closed in front and above by a tumid hard arched scale which is quite nude, though the thick set plumes at the base of the bill pass forward, under the scale, to the anteal point of the nostrils. Tongue somewhat fleshy, triangular, pointed and entire. Intestines 4 feet long, with cæca of ten inches each. Gizzard large, strong and dark-hued, $\frac{1}{8}$ to $\frac{1}{4}$ of an inch thick. Bottom of œsophagus dilated and glandular, but very remote from a galline crop. Head and orbits completely clad; plumage of the body very full, strong and composed; the shafts of the feathers, very strong towards their bases, and rather suddenly attenuated, particularly on the croup, whence results that peculiarity which is so noticeable in Cebbepyrine Shrikes. A small portion of the web of each feather, next the shaft, is very strong; but beyond that limit, the web passes suddenly into very soft down; and beneath each principal plume is a smaller one composed almost wholly of down.† This relates to the interior of the plumage: for, exteriorly, it is composed and of ordinary structure; only somewhat elongated and narrowed, but without lanceolation, on the flanks.

The wings extend considerably beyond the base of the tail, or, usually, to about three inches from its tip. They are very firm, unbowed, and void of gradation in the prime quills, the 4 first of which are nearly of equal length, commonly exceeding the tertials by about $\frac{1}{2}$ an inch.

* Cervical vertebræ 13. Dorsal, 7. Superior processes of the spinal column large, $\frac{1}{2}$ inch and more high. 3 false ribs. Scapula strong and flat. Cavity of the sternum, or chest and abdomen, very capacious, being 3 inches in depth, and 2 in width. Sternal crest or keel, moderate; and the sternum not much produced over the belly.

† The peculiarity adverted to is not proper to our Lerwa alone, but is by no means so conspicuous in other allied birds.

The latter, as well as the scapulars, are long and firm. The tail, like the wings, is distinguished by a strength and elongation, very unusual in the partridge tribe, and considerably surpassing the type of Francolinus. It consists of 14, broad, round-pointed plumes, freely exserted from the coverts, and considerably gradated on the sides, so that the form is round at the end; above, it is broadly convex. The legs and feet are both small in relation to the size of the bird and to its Perdicine affinities, but without absolute defect of strength. The tarsi are clad on the inner side down to the insersion of the thumb or hind digit; on the outer side, somewhat less or a little below the spur. In front, they are nearly half nude, and wholly so behind.

The acrotarsial scales are divided angularly along the mesial line, as usual; but they are smaller and less regular in shape than in most of the Gallinaceous birds, and are, properly speaking, reticulo-scutellate, not scutellate nor biscutellate. The acropodia is perfectly scaled; the fore toes, membraned as usual; the lateral toes, nearly equal; the central, not long; the hind, short but perfect, and resting distinctly on its ultimate phalanx when the leg is bent. The lateral small scales of the fore toes are free, giving the pectinated appearance of the feet in the grouse, to which genus our bird has numberless affinities, external and internal; so much so that Tetraoperdix might very well designate the new genus I have proposed for it, if that word were not somewhat unmanageable, in comparison of our Lerwa, which I have therefore preferred, native though it be. The spur on the tarsus of the males is plainly developed, but small, blunt, and uncurved, except in *very* old males which show a slight curve and acumination in the spur.

These birds have the habits and manners of Tetrao rather than of Perdix. They are gregarious in coveys, nestle and breed under jutting rocks, feed on the aromatics, seeds and insects found in the proper Himalayan region, which they never quit, and amid the glaciers of which they take impenetrable refuge when disturbed. Trees they wholly avoid; and are usually found on the flatter and quasi-heathery ledges which form steps from the snow-bound summits of Himalaya. Our splendid pheasants occupy the same sites. The Lerwas moult, I think, twice a year, in spring and autumn; but certainly in autumn, their plumage being most imperfect in August. They are splendid game, with a vigorous flight, shy, and in size and strength equal to a grouse. Their flesh is white, succulent, and possessed of a very high flavour. The sexes resemble each other, and are of nearly equal size; nor do the young differ materially, except in being of duller hue, especially on the breast and flanks, which in the old birds shine with an intense chesnut brown or ochreous red colour. The young have the bill and legs dusky red.

Colour. Black, transversely lineated with white, which is irregularly smeared, especially in summer, with a rusty or chesnut* tinge. Chest and flanks, intense red brown, nearly the hue of the ripe chesnut *fruit*,* and largely picked out on the flanks with white, forming a broad margin to each plume. Lower tail coverts paler than the flanks, and edged with black within their pale tips. Prime quills immaculate and dusky: secondaries, largely whitened towards their ends. Bill and legs, intense coral red, smeared with dusky in young and in moulting birds. Nails dusky. Iris pale brown. A white patch under the wing, next the body.

PERDICINÆ.

Genus ARBOROPHILA *nobis.*

Type. PERDIX OLIVACEA *Lathami ?*

Piora of the Nipalese. Hill partridge and painted partridge of Europeans.

ARBOROPHILA OLIVACEA *nobis.*

Bill equal to the head, or nearly so, slender; the maxilla more than half cut out by a large membranous nareal tect, in which the advanced nares are opened longitudinally, near to the cutting edge, by an elliptic lateral downward cleft. Wings short, bowed and gradated, with the 5th quill longest. Tail 14, drooped, somewhat feeble, extremely rounded and concealed by the coverts. Legs and feet large. Tarsi elevate, unspurred, nude. Toes long; exterior lateral conspicuously larger than the inner. Nails lengthened and straightened. Cheeks invested with a red skin, which is nude in the orbitar region.

Habitat—Central and lower regions of these hills, as well as most of the hilly districts of the Bengal presidency.

Habits and manners—Exclusively a forester, inhabiting the interior of deep woods, and perching as freely as a pheasant. Gregarious in coveys, breeds on the earth, feeds on the ground and on trees, eating berries, seeds and insects. Intestines and cæca longer than in Perdix, with a large powerful gizzard. Has a shrill twittering call. Is very timid and not at all pugnacious. Affinities, various; chiefly with Perdix; not determinable in the present state of Rasorial classification.†

Structure and size—Twelve ounces in weight, twelve inches long, by 18 to 19 in expanse. Bill 1. Tail $2\frac{1}{4}$ to 3. Tarsus 2. Central toe $1\frac{9}{16}$. Hind $\frac{7}{16}$. Bill equal to the head, remarkable for slenderness and straightness, as well as for the size, soft tect and advanced posi-

* Chesnut, the colour of the horse, is very different from chesnut, the colour of the fruit.

† Two pair only of false ribs. Scapula feeble and cylindrical. Sternum produced to the articulation of hip joints: its keel, high. Cervical and dorsal vertebræ 13 and 7, as before.

tion of the nares, which are nearer to the tip of the bill than to the gape. The tect is nude and tumid, but soft and almost membranous; and it runs beneath, as well as above, the nostrils, besides limiting them before and behind. The bill and nares, in a word, bear the same relation to those of Perdix, as the bill and nares of Hemipodius do to those of Coturnix.

The tarsi are high and strong, quite nude, as well as half the knees, and they have the acrotarsial scales of full size, with the customary zigzag division upon the mesial line. The toes, also, are large; and the outer fore is signally longer than the inner. They are membraned as usual. The nails, with the ordinary gallinaceous attributes, are yet very noticeable for size and for straightness. One of the chief characters of this bird consists in the red cheek piece, which, however, is overlaid by close small plumes, except on the orbits. The nude skin is strong and rough, but not properly papillated, not at least as in the pheasants.

The rounded and gradated wings are very similar to those of Perdix. They have the 5th prime quill longest, and the tertials equally long. The wings reach within about two inches of the end of the tail. The 2d to 6th quills, inclusive, are emarginated, high up, on the outer web; entire on the inner. The tail is drooping, and nearly or quite hid by the coverts, but it is not feeble. At the point it is much rounded. The drooping of the tail, with a certain dumpiness in the figure of the bird, give it much the aspect of a quail. The intestines are 3 to 3½ feet long, with cæca of from 4 to 5 inches in length. The gizzard is large, dark, and from ¼ to ⅜ of an inch in thickness. The bottom of the æsophagus is dilated and glandular; but there is no crop. The food consists of wild vetches, seeds, berries and insects.

Colour. It is very brilliant, and changes greatly in the progress towards maturity. The bird ordinarily figured and described is the female. The mature male, in perfect plumage, is as follows. Head and neck, superiorly, bright rusty red. Cheeks and chin immaculate black: sides and front of the neck black, picked out longitudinally with white. Ears immaculate rusty: a fainter stripe below them of the same hue but dashed with the black of the neck. A broad white gorget across the top of the breast. Breast immaculate slaty blue: flanks the same, picked out marginally by ochreous red, and showing a large longitudinal drop of white down the shafts. Centre of the belly and vent, white, dashed with rusty: rest of the bird, olive, immaculate, or shewing narrow transverse lunulæ, forwards; and round or heart-shaped blotches, backwards—both the marks being of a black colour. Undertail coverts, black with broad white tips to each plume. Scapulars, wing coverts and tertials, very largely margined with ochreous red, and the two latter, showing large globose drops of black near the end of each

feather. Alar and caudal plumes, internally, dusky, and for the most part immaculate, but exhibiting a freckled aspect on the external edge by confusion of the proximate hues. The female has the top of the head and neck olive, like the back; the bright rusty hue of those parts in the male being transferred to her throat and front of her neck. Her cheeks are, for the most part, hoary white, more or less dotted with black, sublinearly from the beak under the eye to the ears. Her breast is blue, like the males: but she has no white gorget across the top of it. A line of black dots encloses the red throat and frontal neck, passing from the eye like a zone down either side of the neck, and meeting on the top of the breast, in the situation of the male's gorget. In both sexes the bill is always black, and the orbitar skin crimson: but the legs change from fleshy blue grey with a reddish tint into deep red. The iris is brown: the nails horn colour, passing with the legs and feet, into red. The young at first resemble the female, assuming the mature plumage very gradually in the course of three moults, with transitions too tedious for my taste. But the species, in all its changes, may be instantly known from what has been above stated.

I am tempted to add to the above generic definitions, another calculated for our Hill Chikore, the Perdix Chukor of Hardwicke, but which differs materially from the type both of Perdix and of Francolinus. It has a bill stronger than either, and, with the nares, extremely resembling those of our Lerwa; but the bill is more compressed; and the Chukore is distinguished by a strength of legs far surpassing any bird of the family. It has some other peculiarities which the following character may perhaps serve to pourtray, as a new generic or subgeneric type.

Bill shorter than the head, exceedingly strong, with a large vaulted compressed maxilla, and nearly concealed mandibula. Nares subvertical, small, opened obliquely towards the head. Head plumose. Edge of the eyelids nude and red. Legs and feet very strong. Tarsi nude, sufficiently elevate, with heavy salient scales and blunt spurs. Wings not bowed, scarcely gradated, 3d quill usually longest, 1st and 2d not much less: all three narrowed towards the points; the primes emarginated on both webs. Tail longish, firm and straight, but nearly concealed by the coverts.

If the above distinctions appear worthy of notice, the genus or subgenus may be called Chacura; and the typic species Chacura pugnax.

Habits, exclusively monticolous, on elevate bare, dry, stony slopes; gregarious in large coveys. Lays many eggs of a white colour, in a careless nest, after the manner of the partridges. Has a very sonorous call, and the males are famous for courage and pugnacity, being most easily tamed and shewing none of the shyness of the generality of partridges.

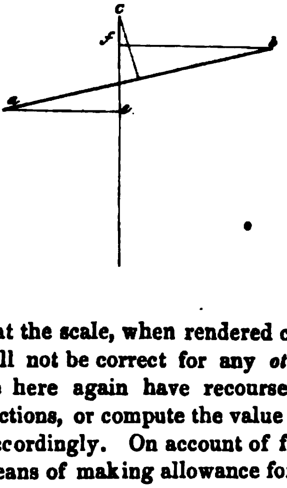
VII.—*Remarks upon the Plans proposed for Constructing a "Self-Registering," and an "Indestructable" Barometer.—By* T. G. Taylor, Esq. *of the Madras Observatory.*

In the January No. of the Madras Journal of Literature and Science, some attempt has been made to meet the present wants of the meteorologist, by supplying him with a barometer which promises to be "indestructable," or, in other words, one which is little liable to get out of order with ordinary rough usage; and in the same No. of the Journal, a further attempt at meteorological improvement is made, in the way of a *self-registering* barometer. That an indestructable barometer is much wanted, is a fact but too well known to every one who has used the ordinary instrument for any length of time on a march or even at a fixed residence; and the importance of a *self-registering* barometer is such, as to render any attempt at its accomplishment a matter of interest. With this view of the subject, and considering that the plans proposed for both of the above purposes are more or less true in theory, I have thought it may not be unacceptable to offer a few remarks relative to their practical utility.

In the first place it must be noticed with regard to both of these plans, that the employment of a metallic tube is highly objectionable, by reason of the little dependence which can be placed in it, to maintain a perfect vacuum for any length of time, even for a day :—not to offer an opinion gratuitously, however, I may mention the experience of Captain Sabine, of the royal artillery. Captain Sabine, requiring an air-tight apparatus, employed Mr. Newman, the justly celebrated and careful philosophical instrument maker. Mr. Newman, fully aware that cast-iron could not be trusted, employed gun metal, and that too of three-quarters of an inch in thickness. The gun metal failed; and an air-tight apparatus was only obtained at length, by covering it on both sides with three coats of paint. In addition to this, and bearing more immediately on the point in question, I may state, that a barometer, constructed upon the "indestructable" plan, has lately been subjected to trial at the Madras Observatory. The tube was made out of a well twisted London-made gun barrel; this of itself proved unequal to exclude air, but was afterwards made tight by a coating of caoutchouc varnish—a precaution, however, which was eventually of no avail, for, on the application of fire, for the purpose of boiling the quicksilver in the tube, the leakage recommenced, so that nothing further could be done with it.

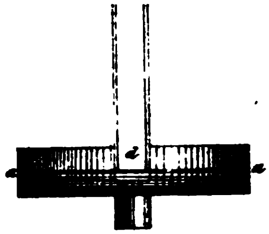
With regard to the self-registering barometer, the idea is certainly, at first sight, a very pretty one, and, but for the metallic tube, *apparently* unobjectionable. Since, however, a metallic tube is not absolutely necessary, we will take the liberty of introducing in its stead a

glass one. We will suppose (as is necessary) that the whole machine is constructed in Europe, where every obstacle in the shape of workmanship vanishes; and consider for a moment the principles of the instrument. In the first place, it will be observed, that the barometer-end of the balance (if we may so term it), has to support a column of mercury of two square inches area, and two inches depth; in addition to which we have to add a tube of iron, whose weight is varying at every fluctuation of the barometer; for it must be recollected that the part immersed in the quicksilver lessens the weight imposed upon this end of the balance to the amount of the weight of an equal volume of quicksilver. Let us suppose, however, that this objection is got rid of (as indeed it can be), by a proportionate allowance in the divisions of the scale, and proceed, in the next place, to notice what takes place when the barometer rises, or when an additional weight is imposed upon the barometer-end of the balance. If the centre of gravity of balance coincides with the axis of support, it is evident that, on a rise (however small) taking place, down goes the barometer, until the lower extremity touches the bottom of the basin *c*—but if, as is usual in practice, the centre of gravity of the balance is *below* the axis of suspension, what then will be the result? If *a b* represent a balance, supported at *e*, and *c d*, a plumb line;—on imposing an additional weight at *a*, that end will descend until the product of the weight on *a* into the perpendicular *a e*, equals the product of the weight on the end *b* into *b f*. Here we see two objections to the self-registering barometer No. 1: 1st, that, in order to ascertain the amount of rise or fall, it becomes necessary by trial to adjust the axis of suspension, to such height above the centre of gravity, as shall render the scale we may have adopted correct: 2dly, that the scale, when rendered correct at the zero or any other point, will not be correct for any *other* point of indication; unless, indeed, we here again have recourse to computation, and from a table of corrections, or compute the value for each division and engrave our scale accordingly. On account of friction (which we have no very certain means of making allowance for in calculations of this sort) it is impossible to say where the centre of gravity should be placed, so that an alteration in the pressure would be read off from a scale of inches, as seems to be Dr. Gilchrist's intention; but, setting aside friction, and assuming the weight of the baro-



meter 15 pounds; it should be about two inches above the centre of gravity.

The above remarks were set down as memoranda on first reading over the papers to which they refer; but, on a second and more careful reading, an objection has offered, which will, I fear, be fatal to the balance barometer;—this I will now proceed to explain—Let *a a* represent the surface of the quicksilver, which being large with regard to the tube *b b*, we may suppose to be fixed, since we can make allowance for its fluctuations; *c c* represents the surface of the quicksilver, corresponding to any given pressure, (29 inches for instance)—Now the weight imposed upon the barometer-end of the balance, is that of the tube, and of a cylinder of quicksilver which may be imagined to surround the column *d d*, which is supported by the pressure of the atmosphere. Let us suppose the atmospheric pressure to be increased to 29, 5 inches; what now takes place? The surface *c c* rises to *e e*, and consequently an additional weight (proportional to *e e*) is imposed upon the barometer-end of the balance;—now the effect of this weight being to lower the whole tube bodily, it follows that a further rise of the surface *e e* will take place, and that, successively, cause and effect will ensue, until the entire tube is filled, or the end of the tube "brought up" by the bottom of the cistern.



The form No. 2 seems to claim attention principally from being constructed of a metallic tube. Leaving this consideration out of the question, it is by no means clear that the plan proposed is more free from objections than many which at present exist. How are we assured that a bubble of air does not exist in the quicksilver between *e* and *c*? For, allowing the stop-cock to be air-tight, still, in the course of carrying, the quicksilver in the short leg being in contact with air, and being agitated forward and back, will assuredly sometimes take up a bubble of air, and thereby render the reading erroneous.

With regard to the self-registering apparatus, it appears to be well adapted to the purpose intended; but the objections to the barometer, which it is proposed to be employed with, must be surmounted, when the self-registering barometer will no doubt be brought into general use.

VIII.—*Contributions to Indian Botany, No. 2.—By* Robert Wight, *Esq.* M. D., F. L. S., *&c. Member of the Imp. Acad. Naturæ Curiosorum. Surgeon on the Madras Establishment.*

Dictyocarpus.*—R. W.

Melochia, *Willd.*—Riedleia, *D'Cand. Prod. Syst. Nat.*—*Wight and Arnott, Prod. Fl. Ind. Orient.*—Sida, *Roxb. Fl. Ind. Vol. 3d.*

Nat. Ord. Malvaceæ.—*Linn. Syst.* Monadelphia decandria.

When Mr. Arnott and myself were elaborating the orders Malvaceæ and Byttneriaceæ for our work, the specimens of this plant we had to consult, were unfortunately so imperfect, as to prevent a careful analysis of the parts of fructification. We were consequently constrained to follow, without sufficient examination, the determination of the justly celebrated botanist (Willdenow) who had first described it from, we presumed, good specimens, aided by a short but precise character, from the pen of the late Dr. Klein of Tranquebar, who sent him the specimens. With these materials before him he referred the plant to the genus Melochia. Decandolle afterwards without seeing it, but guided by Willdenow's description referred it without doubt to the genus Riedleia. Roxburgh who, perhaps about the same time, or even earlier than Willdenow, examined it and had a drawing taken (which was sent with the rest of his collection of drawings to the India House), named it *Sida retusa*; afterwards, I presume from becoming acquainted with the true *Sida retusa*, he changed the specific name but retained the generic one.

Since the publication of our Prodromus, I find that Mr. Arnott has, in an article in the *Annales des Sciences Naturelles*, vol. 2d, page 230, quoted this plant as a true species of Riedleia; while he expresses a doubt as to the other species we have referred to the genus being really species of it, whether as the result of after examination does not appear. A slight examination, on my return to Madras in 1834, of recent specimens, having led me to doubt the correctness of Willdenow and ourselves in referring it to a Byttneriaceous genus, this last remark of Mr. Arnott determined me to re-examine it with care, so soon as I could procure specimens. Owing to its extreme rarity in the southern provinces, I had no opportunity of doing so until my present visit to Madras (where it is a common plant); the result is that I find it to be neither a Melochia, nor a Riedleia, nor referable to the same natural order; but that it forms a genus so very nearly allied to Sida, that might perhaps be referred to it, were it not already so overloaded with species that it is extremely difficult to unravel them.

* Δικτυον *rete*, Καρπος *fructus*; in allusion to the reticulated carpels.

The essential character by which Malvaceæ are distinguished from Byttneriaceæ is their one celled anthers, usually bursting transversely across the apex. In Byttneriaceæ they are two celled and open outwardly. The first step therefore was to determine the natural Order of my plant—it is a true Malvaceæ. The next point was to ascertain whether it was really the same as the one described by Klein and Willdenow. A comparison of the accompanying figure, with the following very succinct character by Klein transmitted with the specimens to Willdenow, will, I think, leave no doubt on that head. "Calyx 5-fidus: Corolla monopetala, 5-partita, basin tubulosa: stamina 10 monadelpha: germen depressum, styli 5, longe flexuosi: capsula depressa, 5-locularis, 5 sperma: semina reticulata trigona." Roxburgh's description corresponds in every essential particular except the last 'semina (carpella) reticulata,' as he speaks of them being "pretty smooth," which does not, however, detract from his known accuracy, since it is not till near maturity that they become strongly reticulated, a state in which he might not have examined them, or he may not have observed it, as it is not till the carpels are removed from the calyx that this beautiful structure comes into view.

Having ascertained its identity with the plant of these authors it only remains to determine the genus.

On comparing the characters above quoted with those of the genus Sida, I find only one of any weight in which they differ. In Sida the stamens are indefinite, here they are constantly definite, twice the number of the petals. Is this a sufficient ground for its separation?

According to the Linnean system, which attaches perhaps an undue weight to the number of stamens, it might be supposed a sufficient reason, and I have no doubt that that alone induced Willdenow to refer it to a genus with definite stamens, though with only half the number, without adverting to the great difference of structure of the anthers. According to the natural system, which pays somewhat less respect to characters taken from the number of stamens alone, other characters being alike, the grounds for separation are not quite so satisfactory; though, for the reason above stated, it seems desirable, as much as possible, to curtail that already overgrown genus, on which account I propose keeping this plant distinct, almost solely on the ground of its definite stamens.

DICTYOCARPUS.

Gen. character.—*Calyx* 5 cleft persistent, without an involucel. *Ovarium* 5 celled, with a solitary ovule in each. *Stamens* 10; *filaments* united at the base, free above. *Styles* 5. *Stigmas* capitate. *Carpels* 5, 1 seeded muticous, reticulated at maturity.

Lith. Engr. Office

Dictyocarpus truncatus. R.W.

A small rather rigid ramous shrub. *Leaves* truncated cuneate. *Stipules* petiolar subulate. *Flowers* solitary on the ends of the branches. *Fruit* flattened, somewhat depressed.

D. *truncatus*.—R. W.

Hab. Frequent in waste grounds about Madras.

Melochia truncata *Willd : sp.* 3. *page* 601.—*Sprengel, Syst :* 3. *p.* 29.
Riedleia truncata *De C. Prod : Syst.* 1. *p.* 491.—*Wight and Arnott, Prod : Fl. Peninsul. Ind. Orient : vol.* 1. *p.* 66.
Sida cuneifolia. *Roxb. Fl. Ind. vol.* 3*d. p.* 170. *Hort. Beng. p.* 50.
Sida retusa. *Roxb. in E. I. C. Mus. tab.* 341.

References to Plate 19.

1. A branch natural size.
2. A leaf, and stipules adhering to the petiole.
3. Flower.
4. Calyx, ovary, style, and stigmas.
5. Ovary cut vertically.
6. ——— transversely.
7. Anther.
8. ——— burst, with grains of pollen.
9. Carpel separate, showing its reticulation.
10. ——— cut vertically, showing the embryo and erect radical *in situ.*
11. Embryo removed from the enclosing albumen, the foliaceous cotyledons drawn aside to show the radicle, which points towards the apex of the seed—all more or less magnified.
12. Carpels united into a 5-celled capsule—natural size.

NIMMOIA.—R. W.

Nat. Order Saxifrageæ.—Lin. Syst. Tetrandria Monogynia.

Among a small collection of Bombay plants, recently communicated by Mr. Nimmo of that place, was one, the general appearance of which struck me as peculiar ; it seemed to differ from any Indian plant I had hitherto met with. This circumstance induced me to examine it with care, and I was much pleased to find it form the type of a new genus of a family nearly unknown in Southern India,* though frequent

* Vahlia is the only known peninsular genus of this order.

in temperate climates, and extending northwards to within a few degrees of perpetual snow.

I was the more pleased with this discovery as it affords me the opportunity of commemorating in the annals of Botany the name of its finder, who has been long an assiduous investigator of the rich flora of that hitherto inadequately explored coast, and who is now the acknowleged head of the *Corps Botanique* of Bombay : a gentleman, whose diligence in collecting, is only equalled by his liberality in distributing the proceeds. With his aid, and that of Mr. Graham, already favourably known to the readers of this Journal by his catalogue of Bombay plants, I hope to have many opportunities of enriching these contributions, and enlarging the catalogue of Indian plants.

Gen. character.—*Calyx* four sepaled; *sepals* cohering, not united to the ovarium. *Petals* four, obovate entire, shortly unguiculate, attached to the top of the calyx, and alternate with its lobes. *Stamens* 4, alternate with the petals, attached to the middle of the tube of the calyx; *filaments* decurrent. *Anthers* 2 celled dehiscing longitudinally. *Ovary* free, sub-pedicellate, imperfectly 2 celled. *Ovules* numerous, attached to an erect central placenta, adhering below to the inflexed margin of the valves, free above. *Style* single, filiform. *Stigma* large, two lobed. *Capsule* free, included within the persistent calyx, 2 valved, incompletely 2 celled, dehiscing transversely across the apex, many seeded. *Seeds* small oval, testa transparent. *Embryo* central, the length of the seed, radicle pointing to the hilum.

Plant herbaceous, glabrous, very ramous. *Leaves* coriaceous, alternate, sessile, cordate at the base, lanceolate acute above, exstipulate. *Flowers* small, red, congested in numerous clusters on the ends of the branches, each bibracteate. *Calyx* and petals persistent, capsule included, dividing the base of the style into two parts during dehiscence.

N. *floribunda.* R. W.

This genus, though agreeing in every particular with the character of the order to which I have referred it, yet has not a single associate with which I can compare it, or with which it can be confounded; the quaternary division of its parts, with its free shortly pedicellate ovary, effectually separate it from every other genus of the order. Vahlia, perhaps the most nearly allied genus, has the calyx cohering with the ovary, and the placenta pendulous from the apex of the cell. Here the case is exactly reversed, the ovary is free, and the placenta erect.

Lith. Chief Engr. Office. *Nimmoia floribunda.* Fort St. George

References to Plate 20.

1. Branch—natural size.
2. Branchel showing the sessile, cordate, exstipulate leaves and terminal cluster of flowers.
3. Stalk and leaf from the lower portion of the branch, showing the inferior leaves lanceolate.
4. Flower with attached leaf and 2 calycine bracts.
5. Calyx laid open to show the attachment of the stamens and petals, the pedicellate free ovary, style, and 2 cleft stigma. The limb of the petals cut off.
6. Ovary divided vertically, showing the erect placenta and numerous ascending ovules.
7. Capsule burst, valves drawn somewhat aside to the placenta and seeds—All more or less magnified.

IX.—*Notice of an Observation of the Lunar Spot Aristarchus.—By* T. G. Taylor, Esq. *of the Madras Observatory. H. E. I. C. Astronomer.*

"At seven o'clock in the evening of the 10th March 1837 I was watching the approach of the Moon's dark border to a star of the 9th magnitude, when my attention was arrested by the appearance of a nebulosity, about as bright as a star of the 6th magnitude, situated upon the Moon's disc, at about four minutes from the unenlightened edge; on referring to a chart of the Moon, the phenomenon evidently proceeded from the spot Aristarchus. I have frequently looked for this appearance during the early age of the Moon, but have never before seen any thing to compare with the brilliancy which I on this occasion witnessed."—*Extract from the Madras Observations.*

The above, it must be acknowledged, offers nothing particularly new; on the contrary, the appearance of Aristarchus as a luminous mass when the Moon is two or three days old, was noticed at least twenty years ago. This spot has always been distinguished, as being the brightest upon the Moon's surface when subjected to the influence of the sun; and, when *not* so influenced, it has at times (when the Moon was two or three days old) exhibited a more or less degree of brilliancy. To account for this phenomenon, Captain

Kater has supposed that a volcano in the act of eruption was the cause; whilst others, again, presuming on the Moon being destitute of an atmosphere, have doubted if, in the absence of oxygen, combustion could take place. It has otherwise been accounted for by supposing this part of the Moon to consist of a somewhat polished surface, and that the varieties of brilliancy were due to changes in the powers of transmission possessed by our atmosphere. However true this latter supposition may be for the variable climate of England, where the observations of this spot have chiefly been made, it cannot, with any degree of propriety, be applied to the fine months of December, January or February in this country, where an uniformity of temperature and pressure, and consequently tranquil sky almost mechanical exists.

It is somewhat remarkable that, during the last ten years, notwithstanding that observers and well constructed telescopes have very much increased in number, still there has not a single notice appeared of this phenomenon having been observed by any one. From my own experience at Madras during the last six years I can state, that on one or two occasions only have I ever *even fancied* that I could distinguish any thing particular in the appearance of this part of the Moon, although my observations for this purpose have been unremitted.

To those who entertain the idea of a volcano in the Moon, the present notice would seem to favour their supposition exactly. The volcano has been quiet during the past ten years and has now burst forth again! A little reflection, however, upon the nature of the motion of the Moon's orbit will show us, that such a supposition may be dispensed with. In the case of a highly polished plateau of land being the cause of the phenomenon in question, its reappearance might be deferred during an interval corresponding to half the period of the regression of the nodes (9¼ years)—but, conjointly with this cause, taking account of the other various disturbances to which the Moon and her orbit are subjected, it is easy to perceive that the occasional appearance and disappearance of Aristarchus may be fully accounted for.

X.—*Horary Meteorological Observations made at the Equinoxes and Solstices, agreeably with the suggestion of Sir* John Herschel.

1st.—At the Madras Observatory—By T. G. Taylor, Esq. *H. E. I. C. Astronomer.*

1837	Time.	Barometer.	Ther.	Wind.	Remarks.
Mar. 20	6 P. M.	29.840	83.4	S.	Clear gentle breeze
	7 „	.850	82.1	S.	do. do. do.
	8 „	.862	81.1	S. E.	do. do. do.
	9 „	.870	80.0	—	do. and calm
	10 „	.876	78.8	E.	do. gentle breeze
	11 „	.878	77.7	E.	do. do. do.
	12 „	.850	76.5	S.	do. do. do.
	1 A. M.	.834	76.2	S. E.	do. very do. do.
	2 „	.820	75.5	S. E.	do. do. do.
	3 „	.810	76.2	W.	Flying clouds do. do.
	4 „	.808	76.4	W.	do. haze do. do.
	5 „	.812	74.8	W.	Clear do. do.
	6 „	.822	74.2	—	Flying cds. calm
	7 „	.848	77.2	—	Clear do.
	8 „	.872	80.0	S.	do. strong breeze
	9 „	.890	82.9	S.	Flying clouds do. do.
	10 „	.896	85.8	S.	Clear do. do.
	11 „	.890	85.0	E.	do. do. do.
	12 „	.872	85.7	S. E.	do. do. do.
„ 21	1 P. M.	.840	86.0	E.	do. do. do.
	2 „	.816	86.3	E.	do. do. do.
	3 „	.788	86.3	S.	do. do. do.
	4 „	.790	86.5	S.	do. do. do.
	5 „	.792	84.5	S. E.	do. do. do.
	6 „	.830	82.4	S. E.	Clear moderate do.
	7 „	.830	81.3	S. E.	do. gentle do.
	8 „	.842	80.6	—	do. calm
	9 „	.844	79.4	—	Haze do.
	10 „	.856	78.3	S. E.	Clear moderate breeze
	11 „	.846	77.9	S.	do. gentle do.
	12 „	.830	77.8	S.	Clear do. do.
	1 A. M.	.806	76.9	S.	do. very do. do.
	2 „	.792	76.8	W. by S.	Fl. cds. and do. do.
	3 „	.770	76.0	W. by S.	do. do. do.
	4 „	.764	75.0	W. by S.	do. haze do. do.
	5 „	.770	74.3	W. by S.	Flying clouds do. do.
	6 „	.776	74.2	S. E.	Clear do. do.
	7 „	.800	76.6	S. E.	Flying clouds do. do.
	8 „	.814	79.7	S. E.	do. strong do.
	9 „	.828	83.7	S.	do. do. do.
	10 „	.836	84.9	S. E.	do. do. do.
	11 „	.820	86.2	S. E.	do. gentle do.
	12 „	.816	85.7	S. E.	Clear strong do.
„ 22	1 P. M.	.792	85.8	S.	do. & haze do. do.
	2 „	.770	85.8	S. E.	do. do. do. do.
	3 „	.756	87.0	S. E.	do. do. do. do.
	4 „	.742	86.4	S. E.	Haze do. do.
	5 „	.756	85.4	S.	do. do. do.
	6 „	.774	82.7	S.	do. do. do.

2*d.*—*At Hoonsoor, in Mysore.*—*By* Wm. Gilchrist, Esq. *of the Madras Medical Establishment.*

Day.	Hour.	Dry thermometer.	Wet bulb therm.	Barometer.	Winds.	Clouds, &c.	Remarks.
Mar. 21	6 A. M.	68	65¾	27.548	E. N. E. occasional airs.	Dense fog.	Dew.
	7	72¾	67¾	.551	Do do do rather stronger.	Fog nearly gone.	
	8	75⅓	69	.574	Do steady do do.	Zenith rather hazy, horizon much so.	
	9	80	69	.600	E. airs merely perceptible.	Do do do less do.	
	10	84	69	.628	Calm. ...	Do do do hazy	
	11	86	66¼	.626	E. N. E. occasional puffs.	Do do do do	
	12	82¼	66	.610	Do do do	Do do do rather hazy.	
	1 P. M.	91	65	.600	Do do do rather strong.	Do clear do do.	
	2	92	64¼	.560	N. E. breeze somewhat gusty.	A few detached white cumuli scattered over sky, horizon still hazy.	Cumuli rose from the W. showing an opposite upper current of air.
	3	91¼	63½	.532	S E. by E. do do do	Large dense, detached cumuli W. horz. dense white cum-strati.	Whirlwinds frequent.
	4	90½	63¾	.514	W. N. W. do.	Cumulo-strati	
	5	91¼	62¾	.520	N. E light breeze.	Zenith cirri, horz. cumulo-strati & hazy	
	6	86¼	72	.530	N. W. breeze.	Cumulo-strati.	Wind has changed frequently last hour between N. E. and N. W.
	7	81¼	71½	.520	S. W. strong breeze.	Zenith clear, horizon hazy, a few cumuli E. horizon.	
	8	78¾	71¼	.536	Do breeze.	Hemisphere hazy.	
	9	77	71	.530	Do do.	Do do.	
	10	76¾	71	.530	Do light breeze.	Do do.	
	11	76	70¾	.528	Do airs occasionally somewhat gusty.	Zenith cirri—horizon hazy.	
	12	76	70½	.540	Do do.	Overcast with cumuli.	
22	1 A. M.	74¼	70	.520	Do do.	Hazy—a few small cumuli.	
	2	73	69	.510	Do light breeze.	Do. small cumuli W. horizon.	
	3	71¼	68½	.516	Do airs.	Small cumulo-strati.	3*h.* 3¼*m.* length of shadow 6.690 inches, upright being 6 inches.
	4	71	68	.512	Calm.	Hazy.	4*h.* 16*m.* do do 14.534 do do.
	5	70	67¼	.520	Do.	Do.	The longer the shadow the less distinct the termination.
	6	69¼	66¾	.512	Do.	Do.	
	7	72¼	69	.520	Do.	Do.	

8		75¼	68½	.528	N. W. occasional light airs.	....	Hazy.
9		81½	70¼	.550	Calm	....	Zenith cloudless, horizon hazy, a few thin cirri S. W.
10		84	68¼	.550	S. E. occasional light airs	....	Zenith a few cirri, horizon hazy
11		87	64¾	.550	Do do do	....	Do cloudless, do do a few cirri to S.
12		88	66¼	.550	S. S. E. light breeze occasionally gusty.		Do cirri do do
1	P. M.	90¼	65	.520	Do do do do		Do do do do	Thermometer in sun 94¾
2		90	64¾	.502	Do breeze do do		Do strati do do
3		91½	65	.480	Do light breeze do do		Do cirri, horizon hazy, dense white cum-strati have risen near to zenith all round
4		90¾	61	.462	E. S. E. do do do		Do and W. quarter dense cumuli, horizon cum-strati.
5		87	72¾	.460	S. W. breeze do do		Sky hazy, cumulo-strati and strati	Wind very disagreeable, feels like hot steam.
6		82	71½	.470	Do do steady	....	General aspect of sky hazy, thin cirri and cumuli in various directions.

The instruments used in making the above observations were placed at a window, having a northern aspect, uninfluenced by radiation or reflection. The dry thermometer was in July 1835 compared with the standard one then in use at the Madras Observatory, and found to be correct—the wet bulb thermometer coincided with the dry one, previously to applying a piece of gauze to the bulb.

The barometer was compared with the one in use at the Madras Observatory in July 1835 and found to indicate .042 too high. The heights of the mercurial column given above, are these as read off without any correction for the error of instrument just mentioned, or for reduction to 32° Fah. of temperature of mercury.

The shadow was determined by an apparatus fitted up for the purpose—consisting of a rod of iron pointed at top, and rising perpendicularly to the height of six inches, exactly above the plane of a piece of wood 2¼ feet long by two inches broad. At each corner of the wood a screw is placed by way of foot; by which is effected the adjustment of the upper surface of the wood to the true horizontal as indicated by two levels attached to it at right angles to each other. In order to see distinctly the shadow, a piece of white paper was pasted on the upper surface of the wood, with every care to preserve a level surface. The termination of the shadow was pricked off at the respective times of observation, and the length between the mark and the semi-diameter of the wire was measured with the detached scale of a barometer the vernier of which read off to 1-500th of an inch.

Hoonsoor is W. 13° South of Seringapatam, distant 28¼ miles, and is W. 5° N. of Mysore distant 26 miles.

2d.—At Hoonsoor, in Mysore.—By Wm. Gilchrist, Esq. *of the Madras Medical Establishment.*

	Hour.	Dry thermometer.	Wet bulb therm.	Barometer.	Winds.	Clouds, &c.	Remarks.
Mar. 21	6 A. M.	68	65¾	27.548	E. N. E. occasional airs.	Dense fog.	Dew.
	7	72¾	67¾	.554	Do do do rather stronger.	Fog nearly gone.	
	8	75⅓	69	.574	Do steady do do.	Zenith rather hazy, horizon much so.	
	9	80	69	.600	E. airs merely perceptible.	Do do do less do.	
	10	84	69	.628	Calm. ...	Do do do hazy	
	11	86	66¼	.626	E. N. E. occasional puffs.	Do do do do	
	12	82¼	66	.610	Do do do	Do do do rather hazy.	
	1 P. M.	91	65	.600	Do do do rather strong.	Do clear do do.	
	2	92	64¼	.560	N. E. breeze somewhat gusty.	A few detached white cumuli scattered over sky, horizon still hazy.	Cumuli rose from the W. showing an opposite upper current of air.
	3	91¼	63½	.532	S E. by E. do do do	Large dense, detached cumuli W. horz. dense white cum-strati.	Whirlwinds frequent.
	4	90½	63¾	.514	W. N. W. do.	Cumulo-strati	
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	7	81¼	71½	.520	S. W. strong breeze.	Zenith clear, horizon hazy, a few cumuli E. horizon.	
	8	78¾	71¼	.536	Do breeze.	Hemisphere hazy.	
	9	77	71	.530	Do do.	Do do.	
	10	76¾	71	.530	Do light breeze.	Do do.	
	11	76	70¾	.528	Do airs occasionally somewhat gusty.	Zenith cirri—horizon hazy.	
	12	76	70½	.540	Do do.	Overcast with cumuli.	
22	1 A. M.	74¾	70	.520	Do do.	Hazy—a few small cumuli.	
	2	73	69	.510	Do light breeze.	Do. small cumuli W. horizon.	
	3	71¾	68¼	.516	Do airs.	Small cumulo-strati.	3*h*. 3¾*m*. length of shadow 6.690 inches, upright being 6 inches.
	4	71	68	.512	Calm.	Hazy.	4*h*. 16*m*. do do 14 534 do do.
	5	70	67¼	.520	Do.	Do.	The longer the shadow the less distinct the termination.
	6	69¼	66¾	.512	Do.	Do.	
	7	72¼	69	.520	Do.	Do.	

8	75½	68¾	.528	N. W. occasional light airs.	Hazy.	
9	81¼	70¼	.550	Calm	Zenith cloudless, horizon hazy, a few thin cirri S. W.	
10	84	68½	.550	S. E. occasional light airs	Zenith a few cirri, horizon hazy	
11	87	64½	.550	Do do do	Do cloudless, do do a few cirri to S.	
12	88	66½	.550	S. S. E. light breeze occasionally gusty.	Do cirri do do	
1 P. M.	90½	65	.520	Do do do do	Do do do do	Thermometer in sun 97¾
2	90	64½	.502	Do breeze do do	Do strati do do	
3	91½	65	.480	Do light breeze do do	Do cirri, horizon hazy, dense white cum-strati have risen near to zenith all round	
4	90¾	64	.462	E. S. E. do do do	Do and W. quarter dense cumuli, horizon cum-strati.	
5	87	72½	.460	S. W. breeze do do	Sky hazy, cumulo-strati and strati	Wind very disagreeable, feels like hot steam.
6	82	71½	.470	Do do steady	General aspect of sky hazy, thin cirri and cumuli in various directions.	

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Abstract Statement of the Funds of the Asiatic Department.

	Disbursements			Receipts.		
Balance in favour of the Society as exhibited in the statement, submitted to the general meeting held on the 30th January 1836......	....	..	..	981	4	0
Difference of interest in favour of the Society as stated in Messrs. Binny and Co.'s account closed on the 31st December 1836..........	....	..	..	22	13	9
Total amount of subscriptions received from the 1st January to the 31st December 1836..	....	..	..	858	5	4
Amount realized by the sale of the Madras Journal of Literature and Science..........	....	..	..	*1125	0	0
Messrs. Binny and Co.'s commission on amount of receipts..............................	23	14	11			
Paid to Mr. Pharoah for printing the 10th, 11th, 12th, and 13th Nos. of the Madras Journal of Literature and Science..........	1458	14	1			
Stationery..............................	38	9	4			
Pay of the Establishment....................	450	0	0			
Sundries..................................	106	8	9			
	2077	15	1	2987	7	1
Deduct disbursements..............				2077	15	1
Balance in favour of the Society..............				909	8	0

* Memo. since realized, Rupees 203.

The following books were presented :—

Fatawa Alemgiri, 6 Vols..............................Bengal Asiatic Society.
Mahabharat, 5 do. .... ditto.
Raj Taringini.................................... ditto.
Susruta.. ditto.
Jawarne ul ilm ul Riyazi............................ ditto.
Jervis's Indian Metrology..............................The Author.
2 Copies of a Catalogue of Stars in the Southern Hemisphere..Hon. Court of Directors.
Result of the Madras Observations for 1834 and 1835......Madras Government.
Report on the State and Navigation of the River Indus below Hyderabad.................................. ditto.
De Kroon Aller Koningen, Van Bocharie Van Djohon...Lieutenant Newbold.
Levensschets Van Sulthan Ibrahiem, translated into Dutch ditto.
2 Siamese Manuscripts................................ ditto.
4 Numbers India Journal of Medical and Physical Science.Frederick Corbyn, Esq.
5 do. India Review of Works on Science........... ditto.
Prison Discipline Reports..............................Howard Malcom, Esq.
Transactions of the Horticultural and Agricultural Society of India, Vols. 2 and 3...............................By the Society.
Chinese Repository, Vols. 3 and 4, and Nos. of Vol. 5, up to No. 6...By the Editor.

The Vidvun-Moda-Taranginee ; or Fountain of Pleasure to the learned, translated into English, by Rajah Kalee-Krishen Bahadur. Second edition..................By the Translator.
Bytal-Puchisi ; or the Twenty-five Tales of Bytal, translated from the Brujbhakha into English, by Rajah Kalee-Krishen Bahadur.................................... ditto.

The thanks of the Society were voted to the Donors.

It was announced that the following Gentlemen have been elected Members of the Society.

The Right Rev. The Lord Bishop.
Brigadier General Wilson, c. b.
I. Y. Fullerton, Esq
A. J. Macleane, Esq.
Captain Philpot,
Lieutenant R. S. Dobbs,
Captain W. Walker,
Captain J. Alexander, re-admitted,
G T. Bayfield, Esq.
Captain Wentworth, H. M. 63d Rt.
Lieutenant Pratt, do.
H. Pilleau, Esq. do.
Dr. White,
Captain Forster,
Hon. Sir E. J. Gambier,
Captain J. J. Underwood,
Lieutenant H. Watts,
Captain A. McCally,
Walter Elliot, Esq.
James Shaw, Esq.
Captain F. Senior, 35th N. I.
Rev. H. Cotterill,
Rev. W. Taylor,

During the past year the Society has lost twelve Members by death, retirement, or departure for Europe.

Read the following letter from Robert Clerk, Esq. Secretary to Government ;—

Fort St. George, 18*th October*, 1836.

No. 1533.—Public Department.

Gentlemen,—I am directed by the Right Honourable the Governor in Council to transmit for your consideration the accompanying copy of a letter dated the 16th June last, from Cavelly Venkata Lutchmiah, with its original enclosures, and also copy of a communication from the Supreme Government, dated the 21st ultimo, on the subject thereof.

2. You will be pleased to ascertain whether Mr. W. Taylor is willing to undertake the work indicated by the Asiatic Society in Calcutta, and if so, the precise assistance which he will require from the Government, in addition to that which he may be expected to receive from the Madras Literary Society.

I have the honour to be, Gentlemen,
Your most obedient servant,
Robert Clerk,
Secretary to Govt.

To the Managing Committee of the Madras Literary Society and Auxiliary of the Royal Asiatic Society.

The whole subject having been referred to the Committee of Papers, for the purpose of ascertaining from the Rev. W. Taylor, as directed by Government, whether he was willing to enter on the undertaking, the following letter, addressed to that gentleman, was read to the Meeting:

APARTMENTS OF THE LITERARY SOCIETY;
MADRAS, *5th December*, 1836.

SIR,—I am directed by the Committee of Papers of the Madras Literary Society and Auxiliary Royal Asiatic Society to furnish you with the accompanying original letter from the secretary to Government, together with its original enclosures, and to request that you will give the whole correspondence your consideration, and acquaint the Committee, for the information of Government, whether you are disposed to undertake the examination of the Mackenzie MSS. in the manner proposed, and to arrange, translate and prepare for publication, any of those documents which may be deemed worthy of such distinction, and, in general, to superintend whatever may be undertaken regarding these MSS. with the sanction of Government, and under the auspices of the Madras Literary Society.

The Committee avail themselves gladly of this opportunity of declaring their cordial concurrence in the opinion expressed by the Committee of Papers of the Asiatic Society of Bengal, as to your fitness for the task which you are invited to undertake; and, duly estimating the zeal and learning which you have displayed in your published works on the languages and history of the South of India, they are glad to be the medium through which you are invited to a literary employment, which they have abundant reason to believe will be consonant to your tastes, and which must be productive of results, highly interesting to the cause of oriental literature.

Should you have it in your power to devote your time to the work indicated, and if your inclination leads you to accept the proffered employ, I am directed to request you will favour the Committee, at your earliest convenience, with a statement of the personal remuneration which you think sufficient for the appropriation of your time and labour, and of the establishment of pundits and writers, which you consider necessary for your assistance, and any other particulars, which your acquaintance with the MSS. in question may enable you to give, as to the expenses which may have to be incurred in the course of the undertaking.

I have the honour to be,
Sir,
Your most obedient servant,
ROBERT COLE,
Secretary Asiatic Department.

To the
REV. W. TAYLOR.

To which the following reply has been received:—

To R. COLE, ESQ.
Sec. to the Asiatic Dept. of the Madras L. S. and A. R. A. S.
&c. &c. &c.

SIR,—I beg leave to acknowledge the receipt of your letter of the 5th instant, and feel duly sensible of the honour which has been done me.

In reply I have the pleasure to state that I am willing to accept of the proposed office; and to do my best towards filling it in a manner which shall be satisfactory to the high and honourable authorities whence the proposition has, in so flatteringly distinguishing a manner, proceeded.

For the collation and examination of the manuscripts, including the restoration by copying of those injured, decayed, or becoming illegible. as may appear desirable on investigation, I am induced to believe that one year will suffice from the time of commencement, as far as regards the manuscripts now at Madras; but it may be desirable prospectively to allow an additional six months on account of those at Calcutta; of the precise extent of which I have no accurate idea. On drawing up a report of general results and recommendations, I may then hope to be ulteriorly favoured with further instructions as to translating, editing and publishing selected portions, if such a course appear suitable to be adopted.

It will be possibly superfluous here to enter into minute details as to purposed modes of proceeding: these must necessarily come within my own charge and responsibility, if confided to me; and in all cases of doubt or uncertainty I shall solicit and hope to receive your official guidance. To the Committee of Papers I am deeply obliged, and feel honoured by their confirmation of the opinion of the Council of the Bengal Asiatic Society, in an enlightened public measure, from which I venture to anticipate some results that will justify their decision to the literary world; and, I would sanguinely hope, distinguish them, in the annals of literature, for an important addition to our knowledge of the history, mythology, philosophy, ethics, and local customs, modes of thinking, and other habits, of the people of this very important portion of the globe.

With respect to the subject of personal remuneration, I beg to declare my very sincere desire that the amount should be on such a moderate scale as to afford evidence of my wish to enter on this work of public utility, with no mercenary motive. I have therefore set down in the margin* a sum which I trust will be considered small for the occasion; and at the same time not so low as to be derogatory to the character of a literary undertaking of such importance, and possessing so much of a national character even, as that I have been honoured by such high authority with an invitation to enter upon.

As regards the establishment of pundits and writers that may be required, I request to be favoured with the assistance of one Sanscrit pundit, and one Canarese and Hala Canada pundit, together with one superior Tamil moonshee from the College, at such time as I shall feel it expedient to apply for such aid. But as there is much to be done of so subordinate a kind in reading, collating and other details, as not immediately to require such superior assistance, I request to be permitted to engage, at my own entire direction, and not as College servants, one good common Tamil and Telugu moonshee, one Canarese moonshee, and two native writers as copyists; the services of a moochie and peon could perhaps be made available to me without extra expense. In such case the probable expense might be—

For two common moonshees, each at 15 Rs. per mensem ....Rs.	30
Two writers, as copyists, each at 10 Rs.................... ,,	20
M. Rupees....	50

The expense of pundits and College moonshees, need not be great; as only requiring to be put on full pay, and that probably for about half the period of time indicated. In so moderate an estimate I am actuated by a desire to keep my own motives clear of all just blame; and not to burden the Government with

* Madras Rupees, three hundred and fifty (350) per mensem.

greater expenditure than the efficient conduct of the undertaking will imperatively require.

I have the honour to be,
Sir,
Your most obedient servant,
W. Taylor.

Madras, *December* 20, 1836.

It was announced to the Meeting that copies of the two foregoing letters had been received from the Committee of Papers, with the following communication :—

To John Carnac Morris, Esq. F. R. S.
Secretary to the Madras Literary Society, &c.

Sir,—1. I am directed by the Committee of Papers to acknowledge the receipt of your letter, dated 28th October 1836, referring for the consideration of the Committee a letter from Robert Clerk, Esq. Secretary to Government, together with its various enclosures, on the subject of the Mackenzie Manuscripts in the languages vernacular in the Peninsula of India.

2. In accordance with the instructions conveyed in the second paragraph of that letter, I have communicated with the Rev. William Taylor, and a copy of his reply accompanies. It will be seen that that gentleman is willing to undertake the examination, collation and restoration of this portion of the Mackenzie Manuscripts, and that the expense of the undertaking, including personal remuneration to Mr. Taylor, and the pay of moonshees and writers, is estimated at 400 Rupees *per mensem*; exclusive of the assistance, for a time, of certain pundits and moonshees.

3. Taking into consideration that the Manuscripts in question form a considerable portion of a collection, which was considered of sufficient importance to be made the object of a purchase by the Supreme Government at a considerable cost, and that they may contain matter of great interest on the history and literature of this country, the Committee cannot but rejoice that measures are likely to be taken to ascertain their precise nature, until a knowledge of which is attained, the purchase may be considered of uncertain value and the original intention unfulfilled. No person appears more fitted, by talents and previous studies, to undertake the laborious investigation than the Rev. W. Taylor; and the committee rely on his judgment and candour to render such a comprehensive and faithful report on them, as would be a guide when the time arrives for considering the ulterior measures of translation and publication. It will be observed that one year, or a year and a half, is laid down by Mr. Taylor as the time that would probably be required to arrive at such a knowledge of the contents of the manuscripts, here and at Calcutta, as would enable him to frame such a report. For that period, therefore, the above stated expense would be entailed; after which it would be for the consideration of the Society and the determination of Government, whether the further charges for translation and publication should be incurred. The labours of this first period would include a collation of the different manuscripts, rendered necessary by great confusion and intermixture among them (as may be gathered from Mr. Taylor's letter at p. 433 of No. 13 of the Journal of the Society); a resto-

ration, if possible, of injured portions: a fair transcript of parts becoming illegible; and an account of the contents of each in some detail. This of itself would be a very considerable advantage.

4. The Committee further desire me to say that, should the work be entered upon in the proposed manner, they will be most happy to afford every aid in their power towards the accomplishment of a design, alike so worthy of the patronage of our enlightened and liberal Government, and of the encouragement of a Literary Society with objects like our own.

The Committee recommend that no time be lost in obtaining from Calcutta the remainder of the Manuscripts in the peninsular languages.

I have the honour to be,
Sir,
Your most obedient servant,
ROBERT COLE,
Secretary Asiatic Department.

Resolved, unanimously—That copies of the foregoing correspondence be transmitted for the information of Government, with an expression of regret that the funds of the Society are quite inadequate to afford any pecuniary aid to this highly desirable public undertaking; but that all the assistance which the Society can render, as a literary body, will be cordially and gladly yielded during the progress of the work.

Read the following letter from Sir Alexander Johnston, Chairman of the Committee of Correspondence of the Royal Asiatic Society.

ROYAL ASIATIC SOCIETY:
Grafton Street, Bond Street, June, 1836.

GENTLEMEN,

The vast extent, fertility, and populousness of our Indian possessions, are known, in a general way, to all the world. A glance, indeed, at the map will shew that their extremes of latitude may, without exaggeration, be indicated by the distance from Gibraltar to the farthest point of Scotland; and that the measure of their extent, from west to east, will be nearly found in a line drawn from the Bay of Biscay to the Black Sea. Lying between the 5th and 31st degree of north latitude, with almost every conceivable variety of position and exposure, they present a range of soil and climate greatly exceeding that which is to be found within the bounds of Europe. They embrace, in truth, the utmost limits of vegetable life, from the burning heat of the desert to the point of perpetual congelation: presenting in one quarter, the loftiest mountains in the world; and, in another, vast alluvial plains, intersected by the natural channels of many noble rivers, with a corresponding variety of productions belonging both to tropical and northern regions. Not less than 80 millions of people are subject to the dominion of England: already they produce (though with imperfect skill) most of the articles which form the great staples of the import trade of this country, as materials of its manufacture, or as the objects of comfort and luxury to the great

body of its inhabitants, of which cotton, silk, indigo, sugar, coffee, and tobacco, may be mentioned as pre-eminent; and they offer an assured prospect of an almost boundless market for the produce of English manufacturing skill, if the capabilities of their country be drawn forth, and their industry be duly instructed, directed, and fostered.

But though these general truths be readily acknowledged, their practical application is very imperfectly understood. Few men in England really know what India does or can produce, with sufficient precision, at least, to justify commercial speculation. Few in India know what England requires; and none of the lights of modern science having been applied to the agriculture of the former country, its productive powers have, as yet, been very imperfectly developed.

Believing that the interests of both countries may be very importantly promoted by an interchange of knowledge, and especially by communicating to India the information and stimulus which are alone wanting to the full development of its vast resources, it has been resolved by the Royal Asiatic Society, to constitute a distinct Section, for the following, and other similar purposes; provided the necessary funds can be raised for giving adequate effect to the design.

1st. The examination of the natural and agricultural products of India, available for the purposes of commerce and art.

2dly. Inquiry into the causes of the general inferiority of the staple articles of Indian commerce.

3dly. The introduction of new articles and processes from analogous climates in other parts of the world.

The Committee of Correspondence of the Royal Asiatic Society beg leave to bring the circumstance to your notice; trusting, confidently, on your zealous support of a measure, calculated to promote objects alike interesting to the patriot and the philanthropist.

Of the means of support, the most acceptable would, of course, be such an accession of new members, European or Asiatic, as would at once provide the necessary funds, and as would afford the requisite contribution of knowledge and experience in the various branches of inquiry to which the labours of the Section are to be directed. But the Society will be most happy to receive the tender of the aid (whether in knowledge or funds) of affiliated Societies, pursuing the same beneficial objects, or any other co-operation or assistance which you may have the goodness to offer.

For the fuller explanation of the scheme in question, the Committee direct me to transmit to you the accompanying printed papers; and I shall be happy to afford you any further information in my power, in regard to it, that you may require.

I have the honour to be,

Gentlemen,

Your most obedient humble servant,

(Signed) Alexander Johnston,

Chairman of the Committee of Correspondence R. A. S.

To the President, Vice Presidents and Members of the Madras Literary Society and Auxiliary R. A. S.

Read a letter from Henry Chamier, Esq. Chief Secretary to Government, forwarding a copy of a letter, addressed by order of the Right Honourable the Governor in Council to the Board of Revenue, directing that the Secretary to the Society, should have access to the Reports of the Civil Engineers, with a view to a selection from the valuable matter contained therein for publication in the Journal of the Society.

The Committee in the Asiatic Department, to whom this letter was referred, will gladly avail themselves of this considerate and liberal order of the Right Honourable the Governor in Council; and their cordial thanks, and the acknowledgments of this Meeting, are respectfully tendered for the privilege granted to the Society.

Read the following extract from a letter from Lieutenant Newbold, with reference to the Siamese MSS. which were laid on the table, presented to the Society by that gentleman:

"I send for presentation to the Society two Siamese books printed at Batavia. What they relate to I know not, having lost the *catalogue raisonnée* of books I brought over from the Straits. These are intended as an *avant courier* of 10 vols. of MSS. Siamese history, which are now on the road to Madras from the Straits, and which I intend for the Society's library, as also a small volume of Siamese laws.

"It would be a great piece of good fortune could the translation of these ancient chronicles in the T'hay language go on simultaneously with that of the history of Lanca in the Cingalese, by the Hon. Mr. Turnour, and that of the Peninsula by Mr. Taylor.

"The Siamese are Buddhists of great antiquity. Their language is monosyllabic; its character you have an opportunity of judging of. Leyden states that the Siamese histories of the T'hay dynasty go back only for the space of 1,400 years; but observes that the records of the T'hay J'hay dynasty are supposed still to exist, from which "it may still be possible to glean a few grains of pure historic gold from the sands which glitter in the long valleys of the *Ménam* and *Mekon*."

"At all events from the collation of the three histories of Peninsular India, Ceylon and Siam, much light would doubtless be thrown on the origin of Buddhism, and perhaps on that of Indo Chinese nations in general.

"Although the historical romances of the Siamese are said to bear little similarity to those of the Brahmuns, still the introduction of Rama and the characters that figure in the Ramayana evince a connexion with Peninsular India. Whether this connexion is merely a literary one or not, remains to be cleared up.

"The Siamese have many romances in common with the Javans, Malays and Buggis, and probably with the Birmese and Peguers.

"According to Hamilton the Buddhism of Siam appears to be identical with that of Ceylon, diffring from that professed in Tartary, Hindostan, China, Japan, and Cochin China. The leading doctrine is the transmigration of the soul, and *Ni-ripan (nirwana)*, or ultimate absorption into the essence of the deity. "The priests "have neither rank, influence nor endowments, the sovereign being the real "head of the church and himself an incarnation of the Buddha."

Read extract of a letter from John Bell, Esq. Secretary to the Agricultural and Horticultural Society of India, forwarding copies of the 2d and 3d volumes of the Transactions of that Society, and offering, on his

own part, copies of his works on the Commerce of Bengal. The acknowledgments of the Society are tendered to Mr. Bell, with the assurance that the donation will be most acceptable.

Read a Letter from Rajah Kalikrishna Bahadur of Calcutta, forwarding copies of his translations into English from Sanscrit and Braj-Bhákâ for presentation to the Society. The acknowledgments of the Society are offered to the Rajah for the same.

Read a letter from M. Eugene Arnoult, editor of the Journal, entitled *L' Institut*, proposing that the Society should communicate an account of its transactions for insertion in the periodical conducted by him; also abstracts of all papers presented to the Society, and copies of works published, and requesting the Society to subscribe to his publication.

Ordered that the Journal of the Society be transmitted to M. Arnoult, with the intimation that the Society will be glad to exchange publications.

It was intimated that, in accordance with the vote of last year, the following works were ordered and had been received from the bookseller ;

	Vols.
Hardwicke's Indian Zoology. By Gray	2
A Series of Maps Modern and Ancient	1
Supplement to the Encyclopædia Britannica, 5th and 6th Vols.	2
Webster's English Dictionary	2
Dictionnaire De L'Academie Française	2
Græcum Lexicon Hederico	1
Marsden's Malay Dictionary	1
Alberti Dictionnaire, Française-Italien, et Italien-Française	2
German Dictionary. By Flugel	2
Spanish Dictionary. By Newman and Baretti	2
Italian Dictionary. By Baretti	2
Portuguese Dictionary. By Vieyra	2
Gesenius's Hebrew Lexicon	1
Watson's Biblical and Theological Dictionary	1
Heyne's Tracts on India	1
Sowerby's Mineral Conchology	6
Lyell's Principles of Geology	3
De La Beche's Geological Manual	1
Lindley's Introduction to Botany	1
Lindley's Natural System of Botany	1
Prodromus Floræ Peninsulæ Indiæ Orientalis. By Wight and Arnott	1
Malte-Brun's Universal Geography	9
Turner's Elements of Chemistry	1
Royle's Illustrations of the Botany and other branches of the Natural History of the Himalayan Mountains—9 parts.	
Lardner's Cabinet Cyclopædia	82

The following donations were presented for the Museum :—

Minerals illustrative of Dr. Benza's Geological Papers which have appeared in the Journal of the Society.—By the Author.

A very extensive collection of minerals from the Malay Peninsula, the country between Madras and Bellary and various places of the Ceded Districts.—By Lieut. Newbold.

Geological specimens collected on a journey from Madras to Hoonsoor, and a very extensive suite illustrative of the Magnesite deposit at the latter place.—By Mr. Gilchrist.

A series of specimens of the Magnesite of Salem, and its associated minerals.—By Dr. Wight.

Specimens of trap and laterite from Beder in the Hyderabad territory. (See Madras Journal No. 12, p. 103).—By Lieut. Morland, Assistant Surveyor General.

Minerals from Combaconum.—By the Rev. Mr. Addis.

Geological specimens from Ava, collected by Captain Hannay on his mission to the Singphos.—By G. T. Bayfield, Esq.

The crown of a tooth of the fossil Mastodon in a very perfect state of preservation, from the same country.—By the same.

A terracotta Buddhist image, and one in brass, from Tagoung, the ancient capital of the Burmese empire, bearing Deva-nàgari inscriptions, discovered by Captain Hannay. (See *Journal of the Asiatic Society of Bengal* for March 1836).—By the same.

The best thanks of the Society are tendered to the respective donors.

The limited dimensions of the Society's Apartments is remarked on, and it is brought to the notice of the Meeting by the Secretary that no space exists for the accommodation of the increasing Library of the Society, and for the minerals, antiquities, and other donations, continually presented for the Museum, a great number of which cannot be arranged for want of room.

It is resolved,—That the College Board be addressed to solicit permission for the Society to occupy the central room of the upper floor in the front range of the College, as a Museum, which would enable the Society to allot the whole of the lower apartments to its library.

Resolved,—That, with reference to the order given by Sir Frederick Adam for the transfer of certain sculptures at Masulipatam to the Museum of the Society, the Collector of the district be addressed to request that he will favour the Society by giving the necessary instructions to that effect.—*Vide Journal, No.* 14, *p.* 45.

The Honourable the President is requested to obtain an interview with the Right Honourable Lord Elphinstone, and to solicit His Lordship to accept the office of Patron of the Society.

XII.—Notices of Books.

Transactions of the Agricultural and Horticultural Society of India, Vol. 3d.—Printed at the Serampore Press, 1837.—pp. 320, 8vo.

We hail with no ordinary feelings of satisfaction, the appearance of the third volume of the *Transactions* of the *Agricultural* and *Horticultural Society of India*; presenting us with a detailed account of its proceedings, during the past year. The unequivocal evidence which it affords, of the recent rapid rise in public estimation of the sister sciences of agriculture and horticulture, must prove highly gratifying to every philanthropic mind, on the reflection how intimately their advancement is connected with the welfare and prosperity of the people, in a country so essentially agricultural as this is.

In this view we cannot deny ourselves the pleasure, which the present opportunity affords, of congratulating the country at large, on the possession within its metropolis of such an enterprising association; enjoying as it does the full confidence and liberal patronage of the Indian government; collecting, from all quarters, the accumulated experience of numerous labourers in the same field, to diffuse it, through these volumes, to every part of the civilized world; while, at the same time, it is generously aiding, with its unrivalled means, the formation of numerous other associations, under the same denomination and having similar objects in view, in all parts of the country, all of which are endeavouring, but at a humble distance, to diffuse, within the more contracted limits of their respective localities, the benefits which it is conferring on all India. That the metropolitan societies of the sister presidencies, are, as yet, far from being competent to enter the lists with the parent institution, in the honourable and friendly rivalry of doing good, is a subject rather of regret than of wonder, when it is borne in mind, that they are both comparatively in their infancy, with few members, limited means, and one, at least, (the Madras Sooiety), as yet unaided by any share of government patronage, which has been so liberally extended to the others.* We would not, however, have our agricultural friends in this quarter to despair of having their application for assistance ultimately attended to, since it has not been refused, and we venture to think is only withheld until by its acts the Society has established its claim to the indulgence. Let it prove itself worthy, and we think we may safely predict that it will not be kept long in suspense as to the result of its application, and we think we may with equal safety adduce the two last reports of its proceedings as favourable examples of how much

* The Calcutta Society h as received, nearly from its commenoement, 1000 rupees annually, which has latterly been increased, by a monthly donation to about 2,800, exclusive of 90,000 formerly contributed. The Bombay Society we understand received a donation of 10,000 in aid of its funds. This is as it ought to be, these societies are formed for the good of the country, much more than for any benefit which can accrue to the members and have a claim on the country's support in aid of their exertions for its benefit.

good may be expected to result from its persevering exertions in the course it is now pursuing. While we thus call on the managers of the Society's affairs, at the presidency, diligently to perform the responsible duties they have voluntarily undertaken, we would remind its members, now widely scattered over the interior, that the largest streams are but the aggregate of numerous rills, and that, without their constant contributions, the most mighty rivers would soon be reduced to barren sandy beds; that it is therefore incumbent on them, if they wish well to the country and institution, to afford assistance by contributing all the information in their power.

But should the application of the Society fail in procuring for it the solicited aid, let it be borne in mind, that it is not the pampered nursling, brought up in the lap of luxury, but he who has from his infancy been trained in the school of adversity, that generally proves the most efficient man. In case of disappointment, therefore, there must not be despair, but a redoubling of the Society's exertions. Let it be remembered, that even the Calcutta Society, with all its advantages, was at one time reduced to the brink of ruin, from which it was only saved by the energy of a few of its members.

If such was the case there, in the midst of a dense population, with numerous supporters, and in the receipt of an annual donation from government, it need not be wondered at, if on this side of India, deprived of such advantages, the Madras Society has to encounter similar shocks: but let warning be taken to avoid the rock on which the Calcutta Society so nearly foundered, namely, a too exclusive attention to horticultural operations, leading to the ruin of the funds, and the neglect of the other and more important objects of the institution.

While we thus warn our friends against falling into so grave an error, we disclaim all connection with those persons who urge exclusive attention to agriculture, to the neglect of horticulture, on the part of the Society as a body. They seem to forget, that a large portion of the natives live almost exclusively on vegetable food; that the introduction of our better sorts of culinary vegetables is an object of paramount importance, and that this must be accomplished by the conviction, on their parts, that ours are better than their own; a conviction, which can only be established by actual demonstration, and not by assertion.

At the outset of its career the Bengal Society acted on this principle, and, aided by premiums, with such success, in teaching the natives our mode of culture and the superiority of our vegetables, that it can now dispense with so costly an appendage as a garden. That a similar effect is in progress here, is evident from the marked improvement in quality of the last show of vegetables, as compared with the preceding. But the advantage of forming horticultural schools, though a great one, is not the only or even principal benefit derived from such establishments.

In them experiments, requiring years for their completion, can be undertaken, and conducted through their whole course on the most philosophical principles, not subject to the numerous accidents and contingencies to which individual enterprise is exposed, and at a cost, too, which might for ever prove a bar to their being undertaken for personal gratification, or even in the uncertain hope of their proving a lucrative speculation. An example in point occurs to our memory—hitherto it has been supposed, but without any proof, that the climate of Madras is altogether unfavourable to the production of coffee, and that it never can be grown to advantage here. The determination of this question, appearing to the Society, in a commercial point of view, a matter of the first importance, it has undertaken to set it at rest, by devoting a portion of the garden to the formation of a coffee plantation. Other experiments of the same kind, and having similar objects in view, are now either in progress, or in contemplation with the return of the season.

In addition to these measures actually in progress, arrangements are making to carry into effect, on a scale commensurate with the Society's means, the suggestions of Dr. Wight, published in the pages both of this Journal and in the volume of transactions before us, for the acclimating of foreign fruit and timber trees, edible vegetables, &c.; while it is wished to devote a portion of the garden to the formation of a nursery, for the introduction to the plains of the more valuable sorts of indigenous timber trees, hitherto scarcely known as living plants beyond the precincts of their native jungles. These, in a public point of view, are all important objects, for the attainment of which in Bengal the Botanic Garden is maintained at the public expense; but which in Madras (where no establishment of the kind exists), unless the Society take them in hand, must ever remain undone, for no private individual, however zealous, or whatever may be his pecuniary resources, while subject to all the uncertainties of removal, can be expected to engage in such endless and unrequited labours. Nor must we, in contemplating the general advantages to be derived from such establishments, overlook the local circumstances which render a garden, at whatever cost, almost indispensable to the success of the Madras Society. Here we have not, as in Calcutta, a large government garden, on which to fall back in a case of necessity. There the talented and enthusiastic superintendent of the noblest Botanic Garden in the world, has, hitherto, always been able, when necessary, to appropriate a portion of its extensive grounds to the furtherance of the useful objects of the Society. In Madras, on the contrary, the government apply to the Society to aid its efforts for the amelioration of the country.

We have been induced to enter thus largely on the consideration of the general subject of Horticultural Societies, and of the Madras one in particular, not, we trust, from having formed an exaggerated estimate

of their usefulness, which is certainly great, but in the hope that even our feeble voice may be heard in a distant quarter, and prove not altogether uninfluential in inducing the government of India to place our Society on a par, at least, with that of Bombay, the more so, as it has difficulties and disadvantages of climate to encounter, scarcely to be met with in any other part of India, and has, besides, so wide an extent of country to influence by its example. But, while we thus humbly solicit the supreme government to assist the Society in carrying into effect the very meritorious works on which it is engaged, we address the inhabitants, both European and Native, of the Madras presidency, with more confidence, in the full assurance, that, whatever may be the decision of the supreme government, they will prove themselves worthy of possessing an institution, fitted to diffuse among them much substantial good, and to afford those who take a more immediate interest in its proceedings an inexhaustible fund of agreeable recreation. Let it therefore be the object, as it undoubtedly is the interest, of one and all, to support it heart and hand, in such a manner, that those who willingly and gratuitously put their hands to the work of managing its affairs, may not have them paralysed for want of means to continue their laudable exertions.

To the managers, and presidency members, we would say, recollect the eyes of the whole country are upon you—your proceedings are narrowly watched—and, unless you prove yourselves good stewards and deserving the confidence reposed in you, it will soon be estranged: furnish therefore your friends in the provinces with the means of coming to a correct judgment on your stewardship, by holding regular meetings, at fixed intervals (which are not to be departed from), for the formal transaction of business, reports of which are to be duly published for the information of distant members. Conduct the business of the Society thus regularly and methodically, and you will have little reason to complain of the want either of confidence or support on the part of the provinces.

But we must now return to the point from which we set out, and from which, in our anxiety to forward the cause of agricultural reform and improvement, we have been insensibly led so long to digress—the consideration of the *Transactions of the Agricultural and Horticultural Society of India.* The volume before us is the third of the series. The Society was constituted in 1820, and, early in 1829, published the first volume. Seven years after, in 1836, the second volume issued from the press, and in 1837 the third, equalling in its dimensions either of the preceding two, and showing, in a very advantageous point of view, the growing attention which is given to these pursuits, and the very decided

advantages resulting from early publicity, more effectually to secure which, the transactions are published in parts every three or four months.

The present volume contains 60 original papers occupying the first 198 pages; an appendix; and the remaining portion of the volume (103 pages), under the head of 'Proceedings', gives an abstract of the whole business transacted at the various meetings of the Society. The papers are, as a matter of course, miscellaneously arranged, in the order they were read at the successive meetings. In this notice, instead of considering them seriatim, we will arrange our remarks under separate heads of horticulture and agriculture; the latter divided into two branches, 1st as applied to the production of food; 2d to commercial produce—the second occupying by far the larger portion of the volume.

Of the sixty papers, six only can be considered exclusively horticultural, the first is from the pen of Mr. Masters, the intelligent head gardener of the Botanic Garden, "*On the Propagation of Exogenous Plants.*"

The term exogenous applies to all dicotyledonous plants; but, in the present instance, it may be considered as restricted to trees and shrubs, furnished with a distinct bark, and increasing outwards by annual layers of wood deposited between the bark and that of the preceding year; in contradistinction to the whole tribe of palms, which never increase in thickness from the first, and harden by age from the surface towards the centre. These last, not producing buds and branches, cannot be propagated by any of the methods adapted to increase exogenous plants; namely, grafting, layering, cutting or *gootties*. The main object of the paper is to make better known, and show the advantage of, this last method over all the others. The operation is a very simple one, and much more practised among native than European gardeners. "In young branches of exogenous plants the bark is easily separated from the wood, and if from a young branch of the Letchee tree (or indeed any other tree) we take off a ring of bark nearly an inch in breadth, at a small distance below a healthy leaf-bud, taking care to cut off all communication between the bark above and below; and at the same time if we cover the wound with soft well tempered earth, binding it on securely with any soft bandage, and keeping the whole constantly moistened with water; at the end of about 4 months we shall obtain a strong well rooted plant. As the fibres are emitted from the buds that are above the wound, they will descend into the ball of earth and form roots; as soon as they are seen protruding themselves through the bandage, the branch may be cut off and planted where it is to remain. This method is called propagating by *gootties*, and appears to be the most expeditious method of obtaining strong well rooted plants."

"Of 65 gootties, made in June last, of the *Jonesia Asoca*, the whole were well rooted in October; of 45 layers, made at the same time, none are well rooted now (December), and some just beginning to form." "Of 450 gootties of the Letchee, made in March last, the greater part were taken off well rooted in June, while of 18 layers of *Cordia Sibastina*, made on the 13th November 1832, only one has made sufficient roots to be planted out with safety."

By cuttings is another expeditious and sure method of continuing an individual species or variety. "Of 5,000 cuttings, put into the ground in July last, embracing 56 species, about 3-4ths of them are good rooted plants. Out of 7000 put into the ground in October, embracing 50 species, about 1-3d are dead." From which it appears that early in the rains is the most desirable time to plant cuttings.

The next paper we have to notice is Mr. Speed's "*Remarks on the best mode of cultivating Celery.*" This is a most valuable contribution to agricultural science, as developing a new principle in tropical agriculture, for an account of which we refer to Dr. Wight's paper, page 40 in the last number of this Journal. His improvement consisted in sprouting the seed in a hot bed under glass; it was afterwards found to resist the heat of the climate, better than when raised in the ordinary manner in the shade. It is to be hoped he will follow up the subject by ascertaining whether plants, raised from the seeds of these plants, resist the climate like those of indigenous vegetables, or, in other words, are acclimated; in which case the experiment will prove one of vast importance.

The last paper on horticulture, and of the volume, is "*Directions for cultivating some of the most approved European and Native vegetables in Bengal*, by *Mr. Masters*." From this we make a few extracts. "*Artichoke*, perennial, native of the South of Europe, propagated by seeds, and by suckers. Sow in October, or at any time between September and May. Sow in rich light soil, and when the plants are two or three inches high, prick them out in a fresh bed, six inches distant from each other; when they have become well-rooted, transplant them into deep, rich soil, setting them two feet apart. To propagate by suckers, take off the suckers towards the end of the rainy season, and prick them out six inches apart, treating them in the same manner as directed for seedlings; or if large, they may be planted at once where they are intended to remain. Artichokes in this country are apt to run too much to leaves, producing small heads; to prevent this and to increase the size of the heads, when the plants are from ten to fifteen inches high, cut them off close to the ground, and cover them over with light, dry, old manure; when they have advanced a few inches

above the soil, repeat the operation. If the young plants are tied up for a few days before being cut off, they will become blanched, and may be eaten as salad."

Cabbage.—"Sow from August to November; if before the rains cease, sow in *gumlahs*, and prick out the young plants in sheltered beds of light rich earth; when they have become strong and well rooted, plant them out in strongly manured ground, two feet distant from each other. Plant the late crops in trenches, keeping the plants well earthed up as they grow, and give them plenty of water."

Cauliflower.—"Sow from September to November, and prick out the plants when about two inches high in light soil; when sufficiently strong, plant them in trenches two feet apart, and fill in with old manure. In dry situations, where the plants can be preserved during the rains, sow in February or March. Cauliflowers may also be propagated by cuttings." The following short paper C. K. Robison, Esq. from vol. 2 page 29, appears deserving of attention as it seems to afford a satisfactory explanation of the unusual success which has attended all attempts to raise these vegetables this season at Madras—the seed sown, being the produce of Bengal hence acclimated.

"From an experience of nine years, the duration of this Society, I have found, that in order to have good and early crops of cauliflowers, cabbage, peas, turnips, &c. it is absolutely necessary to sow only acclimated seeds; that is, seed which was the produce of plants raised from imported European or foreign seed, sown during the previous year; and that, for the later crops, Cape of Good Hope and Van Dieman's Land seed answer best. European seeds should never, in my opinion, be sown before the 1st November, and the produce should be chiefly reserved as acclimated seed, for the following season. Hitherto, the distribution of English seeds to the members of the Society has been the cause of uniform disappointment."

Cucumber.—"Sow in rich, light soil, giving the plants plenty of room to run. When they have made four leaves, stop them, by pinching off the leading bud; they will then produce two lateral shoots, which stop in a similar manner; and so continue to treat every new formed shoot, stopping it at the second or third joint. When the plants begin to show fruit, stop the fruiting branches two joints before the fruit, cover the ground with leaves or straw to keep the roots cool, and to prevent the fruit from becoming spotted."

It is a subject of regret in this quarter that Mr. M. has only given us the Bengal names of the native vegetables introduced into his list, as many of them are totally unknown on the coast. Botanical names

would have done much, with the assistance of Ainsley's *Materia Medica Indica*, to relieve us from this difficulty.

Agriculture.—In this division the first papers are two short ones on the introduction of American maize. These are in continuation of other two printed in the preceding volume, from which it appears that this variety is not only much better in quality, but is reckoned to produce 20 per cent in return better than the variety in use in this country; and with less culture. "The introduction of maize on a large scale might I think be successfully followed up without more labour than the planting between the stubble when the paddy is cut. The proper season for planting in Bengal appears to me about the middle of April. The corn should be steeped in water 12 hours, then buried in a cloth under ground until the germs appear. Three seeds in each hole, about four feet apart, will be found the proper distance."—Bell.

On the Coromandel coast where our rice crops are so subject to failure from irregularity of the monsoons, it appears very desirable to introduce largely the culture of so hardy and prolific a grain, and deserving the attention of the Agricultural Society. Small parcels of seed, of the best foreign varieties, might be sent all over the country for trial, and no doubt it would spread if the natives found it a profitable crop.

Guinea grass.—There are three short papers on the culture of this very valuable grass by Messrs. Bell and Hurry, explanatory of the mode of propagating it by both seeds and cuttings. The mode I adopted (for propagating by seed) is this, I prepare a small plot of ground, shaded from the morning sun, being well pulverized, the seed is then freely scattered over it, when the mallee (gardener) kneads the surface with his fingers so as loosely to bury the seed. If the weather is very hot, I cover the plot with mats for a few days *without watering*, and I have never once failed to have abundant returns. When the young grass is about 3 inches, high I have each plant carefully pricked out, so as not to disturb the root, and transplanted into regular beds two feet apart, watering them for a few evenings, until they have taken firm hold of the soil. I have sown guinea grass in every month of the year, and the results have always been successful." Bell.—" Having successfully cultivated this grass for seven years I cannot too strongly recommend it to all planters who require substantial food for cattle.*** The conditions necessary to success in this cultivation are that the lands should not be inundated, nor water stagnate on it, that the crop be kept clean and the land well manured, and after two years the crop changed. The quantity produced from good land, with a little care, is quite prodigious, and four or

five cuttings may be obtained in the season. With watering, an early cutting can be got, if required. I have some which will yield a fair cutting in about fourteen days. In the cold weather it scarcely grows at all, but from March to October it will yield a constant succession of crops, and is a most valuable addition to our green food. In planting, I have found that joints four or five inches long, and about as far apart, set out like canes, generally took root in a week, and, even in the driest weather, a single watering was sufficient to save them all. Close planting answers best, as one weeding is then generally enough; if distant, the coarse grasses generally choak it, unless great attention is paid. I have had as much as forty tons of green food from a single beegah, ascertained by weighing the cuttings of a square yard at a time. It is evident that such a crop must exhaust the land, and for that reason I think it fails if continued beyond the second year."

Joomla rice—Victoria wheat—American sumach.—This paper or rather series of papers is made up, 1st, of extracts of correspondence between Dr. Wallich and Mr. Robert Stuart, Resident of Nepal, on the cultivation of mountain rice, and the probability of its successful introduction into Europe; with a report of experiments, made in the Chelsea Botanic Garden, to determine the practicability of its culture in England, by Mr. Anderson the curator, which failed perhaps from bad management. 2d, an extract from the Plymouth Journal for August 1833, on the Victoria wheat, recommending its introduction into England, on the two-fold grounds of its being exceedingly prolific, and very rapid in its progress to maturity. Whether it would retain these properties in England seems very doubtful. Some that was introduced into Mysore required upwards of 100 days to mature its crop; in its native country from 70 to 75 days is the time specified. This great difference may depend on the climate of Mysore, being colder than that of Victoria. Would it retain its original properties if sown in the warmer climate of the Carnatic? The subject seems to merit a careful trial, and from sowings in several successive months, commencing with the rains in July. We recommend it to the attention of the Agricultural Society. 3d, another extract from the same Journal on American sumach *(Cæsalpinea coredria).* This substance promises to prove such a valuable contribution to the arts, and, probably, at no distant period, to the commerce of this country, that we are tempted to transfer the paper entire to our pages;* the more so as the plant is of tropical origin, and has already been successfully introduced into the Calcutta Botanic garden, as appears from the following notice in the proceedings of the Society. "The Doctor informs the Society that he

* See *Selections* p. 348.—Ed.

has secured a number of plants of the *Cæsalpinea corearia*, or American sumach, raised from seed presented by Mr. Hamilton."

Sugar and Sugar-cane culture.—There are six papers connected with these subjects in the volume. The first, Mr. Piddington's account of the best soils for the cultivation of the sugar cane, has been reprinted in this Journal* ; of the remaining five, three are occupied with accounts of the rapid progress now making in the introduction of the Otaheitan or Mauritius sugar-cane, and its great superiority over indigenous and Chinese sorts now generally in use ; a superiority so self-evident that, wherever they have been tried, the ryots have immediately adopted it. The following extracts from a letter (page 73) of Captain Sleeman, general Superintendent in the Sagour and Nerbudda territory, will show the estimation in which it is held in these districts. "A portion of the cane at Jabulpoor is every season sold in the bazar to cover the expenses of the plantation, and those of experiments in the manufacture of sugar; and the funds have hitherto been found fully sufficient for the purpose." (Proceedings page 39 and 40). "Proved by successful experiments that sugar of excellent quality can be made in the valley of the Nerbudda, a thing never believed by the inhabitants before this plantation was established. The sugar, made by the aid of men from the sugar districts in Oude, bore the same price in the bazars, as that brought from Mirzapore. 2d, that the sugar made from the Otaheite cane is rather better in quality than that made from the small straw coloured cane of the country, and far superior to that made from the large purple cane. 3d, That the cane, after eight years planting, was last season as fine in its beautiful straw-colour, in its size and in the quality of its juice, as when gathered for me in the manufacture by the present secretary of that colony (Mauritius), Captain Hick, in 1827. The plants I brought with me were deposited in the Botanic Garden in Calcutta March 1827, and, in the following season, I was supplied at Jabulpoor with cuttings from these plants. These canes now sent into the bazar as they are cut and sold, fetch about four times as much as the largest cane of the country, being much longer and the juice much finer."

Our notice of this work has already extended to so great a length, that we feel ourselves constrained to defer, till our next number, the consideration of the remaining portion (comprising the whole of the commercial branch of our arrangement); on which occasion we hope to present our readers with a comprehensive account of the numerous papers, forming the bulk of the volume, on the cultivation of cotton and tobacco.

R. W.

* *Vide* No. 13, p. 483.

XIII.—Selections.

1.—*Letter from Mr.* N. B. Ward *to Sir* W. J. Hooker, *on the Growth of Plants without open Exposure to Air.*

Wellclose Square, London, March, 1836.

My dear Sir,

I have lately heard that you wish for some information respecting my new method of growing plants without open exposure to air. As I do not intend to publish at present a detailed account, and as much misrepresentation exists upon the subject, I feel great pleasure in furnishing you with the principal facts, of which you may make any use you please.

The depressing influence of the air of large towns upon vegetation, had, for many years, engaged my attention.

The science of Botany, in consequence of the perusal of the works of the immortal Linnæus, had occupied me from my youth up, and the earliest object of my ambition was to possess an old wall, covered with ferns and mosses. Compelled by circumstances to live surrounded by, and enveloped in, the smoke of numerous manufactories, all my endeavours to keep my favourites alive, proved sooner or later unavailing. I was led, however, to reflect a little more deeply upon the subject, in consequence of a simple incident, which occurred about seven or eight years ago. I had buried the chrysalis of a Sphynx in some moist mould, which was contained in a wide-mouthed glass bottle, covered with a lid. In watching the bottle from day to day, I observed that the moisture which during the heat of the day arose from the mould, condensed on the internal surface of the glass, and returned from whence it came, thus keeping the mould always equally moist. About a week prior to the final change of the insect, a seedling Fern and Grass made their appearauce upon the surface of the mould.

After I had secured my insect, I was anxious to watch the development of these plants in such a confined situation, and accordingly placed the bottle outside my study window. The plants continued to grow, and turned out to be the *Poa annua* and *Nephrodium Filix mas.* I now commenced a series of experiments upon other plants, principally Ferns, selecting those that were most difficult of culture, such as *Hymenophyllum,* &c. My method of proceeding was as follows:—Keeping nature always in view, I endeavoured to imitate the natural condition of the plants as much as possible, as regarded the exposure to light, solar heat, moisture, &c. Thus, if Ferns were the subject of experiment, they were planted in the mould most congenial to them, well watered, but all the superfluous water allowed to drain off, and then placed in a situation having a northern aspect. If, on the

contrary, I wished to grow *Cacti*, they were planted in a mixture of loam and sand, suspended from the roof of the case, and fully exposed to solar heat. Upon this part of the subject I need not, however, dilate any further, and will therefore confine myself to the results obtained.

1st, That the depressing influence of the air of large towns upon vegetation depends almost entirely upon the fuliginous matter with which such an atmosphere is impregnated, and which produces the same effect upon the leaves of plants as upon the lungs of animals.

2ndly, That, owing to the quiet state of the atmosphere surrounding the plants in my inclosed cases, the plants, like human beings, will bear extremes of heat and of cold, which under ordinary circumstances would be fatal to them. It is well known, from the experiments of Sir C. Blagden, and others, that man will bear great degrees of heat with impunity, provided the atmosphere be undisturbed, and it is equally a matter of fact, that the extremest cold of the Arctic Regions produces no bad effect, when the air is quite still. Mr. King, who has recently returned from Captain Back's Expedition, informed me that the greatest degree of cold he experienced was nearly 70 deg. below zero; that no inconvenience was felt at that low temperature, owing to the perfectly calm state of the air; but that if the wind arose, although the thermometer would likewise rapidly rise with the wind, the cold then became insupportable.

These facts I have proved in the one case, by the exposure to sun of *Hymenophyllum* and *Trichomanes*; and in the other by growing without heat *Aspidium molle*, *Phœnix dactylifera*, *Rhapis flabelliformis*, *Dendrobium pulchellum*, *Mammillaria tenuis*, &c. &c.

3rdly, That owing to the prevention of the escape of the moisture contained within the cases, plants will grow for many months, and even for years, without requiring fresh supplies of water. Thus, in the first experiment, the *Poa* and *Nephrodium* grew for four years, without one drop of water having been given to them during that period, and would, I believe, have grown as many more, had they not accidentally perished in consequence of the rusting of the tin lid covering the bottle, and the admission of rain-water.

4thly, That the degree of development to which the plants attain, depend mainly, *cæteris paribus*, upon the volume of air contained within the case, and upon the quantity of light and solar heat received by the plants. Thus to revert to the first experiment. The *Poa* and *Nephrodium*, being contained within a small bottle—the one flowered but once during its confinement, while the other did not produce any capsules. Both *Ferns* and *Grasses*, in my larger cases, flower and fruit well. *Phænogamous plants*, such for instance, as *Ipomæa Quamoclit* and *coccinea*, will not flower in a case exposed to the north, while in

the same case, fully exposed to the south, these very plants come up from seed, and flower very well.

To sum up all, in every place where there is light, even in the centre of the most crowded and smoky cities, plants of almost every family may be grown, and particularly those which have heretofore been found the most difficult to cultivate. I have now, in a wide-mouthed bottle, simply and loosely covered with a tin lid, the following plants:—*Hymenophyllum Tunbridgense* and *Wilsoni*, *Trichomanes brevisetum*, *Hookeria lucens*, and other Mosses, *Jungermannia juniperina* and *reptans*, &c. &c. These plants have been inclosed for twelve months, and are growing most vigorously, although they have not once been watered during that period. In my other cases, the *Ferns*, *Palms*, *Orchideæ*, *Grasses*, many Monocotyledonous plants belonging to the families of *Scitamineæ*, *Bromeliaceæ*, &c. &c. grow very well; while, on the contrary, the continued humid state of the atmosphere is unfavourable to the development of the flowers of most of the *Exogenous plants*, excepting those which naturally grow in moist and shady situations, the *Linnæa borealis*, for instance, which I have had for more than two years, and which flowered twice last year in a situation where, without my protecting cases, the *London Pride (Saxifraga umbrosa)* ceases to exist after twelve or eighteen months.

This method will, I believe, assist the physiological Botanist in solving some points of great importance, connected with vegetation in general, such as the agency of various soils, the quantum of air necessary for the development of various tribes of plants, &c. &c.; and I shall be delighted in seeing the subject taken up by those, who, with far greater knowledge than I possess, have likewise better opportunities of prosecuting these interesting inquiries. Occupied, as I have unceasingly been for the last twenty years, with the harassing details of general medical practice, and living constantly in town, I find it impossible to do all that I wish, nor could I have gone on thus far, but for the unbounded liberality of Messrs. Loddiges, who from their ample stores, have most kindly furnished me with every plant I desired for the purposes of experiment.

I come now to the most important application of the above facts: that of the conveyance of plants upon long voyages. Reflecting upon the causes of the failure attending such conveyance, arising chiefly from deficiency or redundancy of water, from the spray of the sea, or from the want of light in protecting them from the spray, it was, of course, evident that my new method offered a ready means of obviating all these difficulties, and in the beginning of June, 1833, I filled two cases with Ferns, Grasses, &c., and sent them to Sydney under the care of my zealous friend, Captain Mallard, copies of whose letters I have enclosed.

The cases were refilled at Sydney, in the month of February, 1834, the thermometer then being between 90° and 100°. In their passage to England, they encountered very varying temperatures. The thermometer fell to 20° in rounding Cape Horn, and the decks were covered a foot deep with snow. In crossing the line the thermometer rose to 120°, and fell to 40° on their arrival in the British channel, in the beginning of November, eight months after they were enclosed. These plants were not once watered during their voyage, received no protection by day or by night, but were yet taken out at Loddiges' in the most healthy and vigorous condition. The plants chiefly consisted of Ferns, among them *Gleichenia microphylla* never before introduced alive, and the *Hymenophyllum Tunbridgense*. Several plants of *Callicoma serrata* had come up from seed during the voyage, and were in a very healthy state. As this experiment was made chiefly with *Ferns*, I will briefly give you an account of one other experiment, in which plants of a higher order of development were the subject of trial. Ibrahim Pacha being desirous to obtain useful and ornamental plants for his garden near Cairo, and at Damascus, commissioned his agents in this country to send them. I was requested by his agents to select them, and they were sent out in August, 1834, in the Nile Steamer, to Alexandria. They were about two months on their passage, and I have enclosed a copy of the letter from Mr. Traill, his gardener, giving an account of their condition when he received them; and have likewise sent you a list of the plants, which were contained in the Egyptian cases. I have, as yet, received no account of the Syrian plants. Various other trials have been made to other parts of the world, as Calcutta, Para, &c. &c., and with the same success.

I feel well assured that this method of importing plants would likewise be extremely useful in the introdcution of many of the lower but most interesting tribes of animals, which have never yet been seen alive in this country.

In reply to an inquiry that was addressed to Mr. Ward, as to the advisability of a collector's taking glased boxes to Brasil, Mr. Ward thus writes. "I should imagine that these may be easily procured at Rio, and various other places; but if glass cannot be obtained, or is very dear, then a number of small panes might be carried, for use, as occasion requires.

"It may be as well to state, once for all, that the success of my plan is in exact proportion to the admission of light to all parts of the growing plants, and to the due regulation of the humidity of the mould wherein they grow. It is safer, in all instances, to give rather too little than too much water. If *Ferns*, for example, are the subject of experiment, they should be planted in the soil most congenial to them, well watered, but all the superfluous fluid allowed to drain off, before the case

is finally closed; while on the other hand, succulent plants should be set in dry sand. I need not, however, dilate upon this, any further than by observing that the natural condition of the species should be imitated, as far as possible, except in the free exposure to air. The smaller species of *Cacti* will travel well, suspended in my cases, without any mould. The larger species, according to Loddiges, should be packed in very fine and dry sand. All vegetable matters, used as package, are very injurious.

"You ask how the tropical *Orchideæ* may be best conveyed:—most certainly in the glazed cases: I believe, that, thus secured, ninety-five out of every hundred may be imported in a vigorous state from any part of the world, provided the voyage does not exceed eight or ten months in duration.

"In all instances, the plants require no attention during the voyage; the sole care requisite being to keep them in the light.

"You next enquire, what plan I would suggest, where glazed boxes are not procurable, and here I must give you higher authority than my own, that of Messrs. Loddiges, who find the means adopted by your American correspondent, the most eligible, viz., that of packing them in moderately moist *Sphagna*;—always excepting the succulent plants.

"Would it not be advisable to direct the attention of your collector, particularly, to the introduction of such plants as have never yet been seen alive in this country, owing to the impossibility of importing them in the old method? Every species of *Trichomanes* and *Hymenophyllum* might thus become inmates of our stoves, as well as a number of other interesting plants, which possess oily nuts or seeds, that quickly lose their germinating property, after they are ripe. These seeds might be sown in the mould among the other plants, and would come up during the voyage. All the *Palms* and *Bertholletia*, &c. would succeed admirably in this way.

"I may remark, that there is one point, upon which misconception exists very generally, even among well informed men. Because my cases are made quite tight, it is imagined, that the plants contained in them receive no change of air. Now, it must be obvious to every one who reflects for an instant on the subject, that owing to the expansibility of the air by heat, there must, with every change of temperature, be a corresponding change in the volume of air contained within the cases. Without such a variation, the plants would, in all probability, soon perish."

N. B. Ward.

Hobart Town, Nov. 23, 1833.

Sir,—You will, I am sure, be much pleased to hear, that your experiment for the preservation of plants alive, without the necessity of water, or open exposure to the air, has *fully succeeded*,

The two boxes entrusted to my care, containing ferns, mosses, grasses, &c., are now on the poop of the ship (where they have been all the voyage), and the plants (with the exception of two or three ferns, which appear to have faded) are all *alive* and *vigorous*.

During the very hot weather near the equator, I gave them once a light sprinkling of water; and that is all they have received during the passage.

All the plants have grown a great deal, particularly the grasses, which have been attempting to push the top of the box off.

I shall carry them forward to Sydney, according to your instructions, and have no doubt of delivering them into the hands of Mr. Cunningham in the same flourishing state as they are at present.

Allow me, in conclusion, to offer you my warm congratulations upon the success of this simple but beautiful discovery for the preservation of plants in the living state upon the longest voyages; and I feel not a little pride in having been the instrument by which the truth of your new principle has been fully proved by experiment.

I am, Sir, &c. &c.

CHARLES MALLARD.

Barque Persian, at Sydney, Jan. 18th, 1834.

Sir,—I have the happiness to inform you, that the plants (ferns, mosses, &c.) contained in the two glazed cases entrusted to my care, were landed here at the Botanical Garden, about three weeks ago, nearly the whole of them alive and flourishing. They have since been transplanted by Mr. M'Lean, who has charge of the garden in the absence of Mr. Cunningham (gone to New Zealand botanizing), and are all doing well.

The complete success of your interesting experiment has been decidedly proved; and whilst offering you my congratulations upon this agreeable result, I cannot but feel some little degree of pride and pleasure in having been the instrument selected to put to the proof so important a discovery to the botanical world,

I am, Sir, &c. &c,

CHARLES MALLARD.

P. S. I ought to have mentioned that, during the voyage, the plants were watered but once, and that but a light sprinkling near the equator, and were on deck (on the poop) the whole passage.

Cairo, April 30, 1835.

Sir,—I beg to acknowledge the receipt of your letter of 2d ultimo, wherein you request information as to the state of the plants sent out by you in the Nile steamer. The collection consisted, I believe, of 172

species, contained in six glazed cases, two of which only were forwarded to me from Alexandria. The one which you mention as having been fitted up with talc, together with three others, were sent on to Syria immediately on their arrival in Alexandria, so that I had no opportunity of seeing them.

I have, however, the pleasure to inform you, that the Egyptian portion of the collection was received here in the very best condition: the plants, when removed from the cases, did not appear to have suffered in the slightest degree; they were in a perfectly fresh and vigorous state, and, in fact, hardly a leaf had been lost during their passage. Your plan, I think decidedly a good one, and ought to be made generally known.

I am, Sir, &c. &c.
J. Traill.

List of plants contained in the two cases sent to Egypt.

Achras Sapota.
Aleurites triloba.
Alpinia nutans.
Anona Cherimoyer.
Bignonia venusta.
Bombax Gossypium.
Brexia spinosa.
Caryota urens.
Cedrela odorata.
Combretum comosum.
Croton variegatum.
Curcuma longa.
Cycas revoluta.
Dalbergia scandens.
Dimocarpus Litchi.
Diospyros cordifolia.
Diospyros edulis.
Diospyros embryopteris.
Doryanthes excelsa.
Dracæna edulis.
Dracæna terminalis.
Erythrina crista-galli.
Ficus elastica.
Flacourtia cataphracta.
Franciscea uniflora.
Gomutus saccharifer.
Jatropha panduræfolia.
Jonesia pinnata.
Ixora coccinea.
Latania borbonica.
Laurus Cassia.
Laurus Cinnamomum.
Maranta arundinacea.
Maranta zebrina.
Maranta bicolor.
Melastoma Fothergilli.
Menispermum Cocculus.
Melaleuca cajeputi.
Mimusops Elengi.
Morus tinctoria.
Myrtus Pimenta.
Oreodoxia regia.
Pandanus odoratissimus.
Passiflora racemosa.
Piper Betel.
Piper nigrum.
Psidium chinense.
Terminalia angustifolia.
Uvaria odoratissima.
Vanilla planifolia.
Zingiber officinale.

2.—Notes on the Drugs called Mishme Teeta and Pucha Pat. *By* N. Wallich, M. D.

About a year ago I received from Captain Jenkins, Agent to the Governor General on the N. E. Frontiers of Bengal, a small supply of a medicinal root, which he informed me was in great repute in Assam, and among the tribes inhabiting the adjoining countries. I have since been able, through the kindness of Lieut. Charlton, of Suddeya in Upper Assam, to determine with certainty the nature of the plant which yields this root; and I have now the pleasure to submit some notes on the subject to the Medical and Physical Society, together with the result of the experiments made by my valued friend Mr. Twining, to ascertain the properties and medicinal use of the drug.

Mishme Teeta is the name by which this drug is designated among the Mishmees and Lamas in the mountainous regions bordering upon Upper Assam. The Chinese call it *Honglane.* Among these three nations, it is in great estimation, and in universal use as a powerful tonic and stomachic. Quantities are sent down to Assam in neat little baskets, with open meshes, made of narrow slips of ratan, or some such material, and measuring 3 to 4 inches in length by 2¼ in breadth and 1¼ in width. Each basket contains about an ounce of small pieces of the root, from 1 to 3 inches long; they are nearly cylindric, uneven, scabrous, more or less curved, of a greyish brown colour, and varying in thickness from the size of a crow-quill, to double that diameter. The root is perfectly dry and brittle; occasionally a few fibrillæ are issuing from one end; the inside is hard, somewhat cellular, the outside of a dingy yellow colour. The taste is intensely and purely bitter, very lasting and with only a very slight aroma; on mastication, the root tinges the saliva yellow; its interior is bright-yellow or gold-colored. It possesses no smell whatever.

In March last, I received from Lieut. Charlton some fresh roots with leaves attached, which he had obligingly procured for me from the hills. They are still alive, and in a healthy condition, notwithstanding the great disparity of climate which they have to endure in Bengal, chiefly in regard to temperature. The leaves have withered away; but fresh roots are at the present time making their appearance. I am therefore not without some hopes of preserving this valuable plant in the Honorable Company's Botanic Garden; or at any rate of introducing it hereafter into localities where it may have a better chance of thriving. I have subsequently had the pleasure of obtaining from the same liberal source two incomplete specimens of the inflorescence together with unripe fruit, produced by the plants at Suddeya. These are the materials from which the following brief notes have been taken.

Coptis Teeta, foliis trisectis, segmentis petiolatis, lobato-pinnatifidis, lobis incisis acutissime setaceo-serratis; scapo paucifloro, bracteis foliaceis line-ari tripartitis.

Radix subcarnosa, multiceps, fibrillosa, intus luteo-aurea. Surculus .... ? Folia erecta, glabra, longe petiolata, texturâ firmâ et rigidiusculâ, habituque frondem filicis cujusdem dorsiferæ referentia; circumscriptione ovato-cordata, attenuato-acuminata, quadripollicaria; segmenta petiolo partiali ½ pollicari suffulta, lateralia semi-cordato-ovata, extus fere bipartita, pollices duos longa; intermedium duplo majus, paullo longius petiolatum, attenuatum in acumen, basi cuneatâ subdecurrente: omnia inciso-pinnatifida, lobis obtusis, serraturis latiusculis setâ terminatis, reticulata, nervis supra puberulis, venis extimis curvato-furcatis. Petiolus gracilis, longitudine circiter folii, basi dilatatus. Scapus teres, erectus, tenuis, striatulus, folia longitudine æquans, apice gerens flores paucos (vix ultra tres) parvos, alternos, pedunculatos. Sepala oblongo-lanceolata, attenuata, acuta, albida, parallele venulosa, glabra, unguem longa, fugacissima. Petala lineari-ligulata, obtusa sepalis triplo breviora, planiuscula (?) Stamina pistillaque plura; antheræ planorotundatæ, albidæ. Carpella immatura membranacea, 3-5-ovulata, breve stipitata, stylo terminata carnoso subcylindrico, æquante, adscendente-recurvato, intus (stigmate) scabrido. Bractea sub singulo pedunculo foliacea, angusto-linearis, serraturis setaceis marginata, infima tripartita. Pedunculi fructiferi elongati.

Coptis belongs to the subdivision of Ranunculaceæ, called Helleboreæ. It consists of three species: namely, *C. Teeta*, and the two following.

C. trifolia, Salisb. in Linn. Trans. vol. viii. p. 305; Bigelow, Amer. Med. Botany, vol. i. p. 60, t. 5; Decand. Syst. Veg. vol. i. p. 322 et Prodr. vol. i. p. 47; Lodd. Bot. Cab. 2. n. 173. *Helleborus trifolius*, Linn. Amoen. Acad. vol. ii. p. 355. tab. 4, fig. 18. *Anemone Groenlandica*, Müll. Flor. Dan. vol. vi. p. 5. tab. 166.

This is a native of the most northern parts of Europe and of North America, and is quite distinct from our plant by its rounded obovate leaflets.

C. asplenifolia, Salisb. loc. cit. p. 306; Pursh. Flor. Boreal. Amer. vol. ii. p. 39; Decand. locis cit.; Smith in Cyclop. Rees, vol. xix. ad calcem vocis Isopyri, quo teste *Thalictrum japonicum*, Thunb. in Act. Soc. Linn. vol. ii. p. 337, et *DidynamistaSalviæ similis*, Ejusd. Flor. Japon. p. 364, num. 43 (inter plantas obscuras) huc pertinent.

A native of the west coast of North America, where it was found by my venerable friend Mr. Archibald Menzies, who is, I believe the only survivor of the party that accompanied Captain Vancouver in his voyage round the world. It has also been found in Japan, according

to Thunberg. The plant comes near to Coptis Teeta, agreeing with it in the fern-like appearance of the leaves, from whence it derives its name, and which indeed at first deceived me into a supposition of ours being a member of that tribe.

The nearest allied genus is *Isopyrum*, of which Mr. Royle's very valuable and important work, Illustrations of the Botany of the Himalaya, contains descriptions and figures of two species; namely *Isopyrum grandiflorum* Fischer, Royle Illustr. p. 55, t. 11. fig. 3, from Kunnawur; and *I. microphyllum* Royle, loc. cit. fig. 4, (tab. 1 being quoted by mistake in both instances for tab. 11), from Buddrinath, where it was found by the plant-collectors employed under me.

As it is very probable that the medicinal properties of Mishme Teeta will be found to agree with those of the *Gold-thread* of North America (Coptis trifolia), so called from the colour of the root, I extract in this place the following interesting account from Professor Bigelow's work quoted above, p. 62.

"The root of this plant is a pure intense bitter, scarcely modified by any other taste. In distillation it communicates no decided sensible quality to water. The constituent with which it most abounds is a bitter extractive matter, soluble both in water and alcohol. It seems destitute of resinous or gummy portions, since the residuum from an evaporated solution in alcohol is readily dissolved in water, and vice versâ. It is devoid of astringency when chewed in the mouth, and it gives no indication of the presence of tannin or gallic acid when tested with animal gelatin, or with sulphate of iron. The abundance of the bitter principle is evinced by the acetate of lead and nitrate of silver, both of which throw down a copious precipitate. The sulphuric, nitric, and muriatic acids occasion no change, and the muriate of tin gives only a slight precipitate, after some time standing.

"Of this article larger quantities are sold in the druggists' shops in Boston, than of almost any indigenous production. The demand for it arises from its supposed efficacy as a local application in aphthous, and other ulcerations of the mouth. Its reputation, however, in these cases is wholly unmerited, since it possesses no astringent or stimulating quality, by which it can act on the ulcerated spots; and where benefit has attended its use, it is doubtless to be ascribed to other articles possessing the above properties, with which it is usually combined.

"As a pure tonic bitter, capable of strengthening the viscera, and promoting digestion, it is entitled to rank with most articles of that kind now in use. Its character resembles that of Gentian, Quassia, and Colombo, being a simple bitter without aroma or astringency. The tincture, made by digesting half an ounce of the bruised root in eight ounces of diluted alcohol, forms a preparation of a fine yellow colour, possessing the whole bitterness of the plant. I have given it in various in-

stances to dyspeptics and convalescents, who have generally expressed satisfaction from its effects, at least, as frequently as from other medicines of its class. A tea-spoonful may be taken three times a day. In substance it rests well on the stomach in doses of ten or twenty grains. It is, however, difficult to reduce to powder, on account of the tenacity of its fibres."

I shall now advert to another vegetable substance which, although most extensively used by the natives of this country, has hitherto continued one of the problems in our Indian Materia Medica. The drug, to which I allude, is called in Bengalee as well as in Hindee, *Puchá Pát*, and is found in every bazar almost throughout Hindustan. My esteemed friend Baboo Radhakant Deb informs me, that "there exists no Sanscrita name for this leaf, which is largely imported by Mogul merchants; that it is used as an ingredient in tobacco for smoking, and for scenting the hair of women, and that the essential oil is in common use for imparting the peculiar fragrance of the leaf to clothes among the superior classes of natives." I believe that the people of the peninsula are peculiarly fond of this perfume, as are also the Roman Catholic inhabitants of this country generally.

Having ascertained, on my return from Europe two years ago, that a large quantity of what appeared to be the same drug as that commonly sold in the bazars under the name of Puchá Pát had been imported from Penang, I requested Mr. George Porter, late of that island, and formerly in charge of the botanical establishment there, to favour me with an account of the article, and also, if possible, with some growing plants of it. In February last year (1834), I had the pleasure to receive from him several plants, which I have succeeded in multiplying by cuttings, and which appear to thrive remarkably well in this garden. Mr. Porter has furnished me with the following memorandum: "The Puchá Pát grows perfectly wild at Penang, and on the opposite shore of the Malay Peninsula, in Wellesley province. The Arabs use and export it more than any other nation. Their annual pilgrim ship takes up an immense quantity of the leaf. They use it principally for stuffing matrasses and pillows, and assert, that it is very efficacious in preventing contagion and prolonging life. It requires no sort of preparation, being simply gathered and dried in the sun; too much drying, however, is hurtful, in as much as it renders the leaf liable to crumble to dust in packing and stowing on board. In Penang it sells at the rate of a dollar and a quarter, to a dollar and a half, per pekul. In Bengal, some which was sent from thence several years ago, sold at 11 rupees 8 annas per maund. At times the price is much higher. The last investment sold so low as six rupees only per maund. It has not been seen in flower." So far Mr. Porter's memorandum.

The Puchá Pát plant is evidently of the family of Labiatæ. It forms a shrub (in the Botanical Garden) of two to three feet in height. The obtusely four-cornered branches and the leaves are juicy, and somewhat fleshy, and covered, especially the inferior surface of the latter, with a great deal of soft, pallid pubescence, which gives the plant a greyish appearance. All the young parts are densely villous. The leaves are opposite, petioled, ovate, obtuse, grossly and obtusely lobato-crenate, measuring from two to four inches; the lowermost on the branches are subcordate, all the others are cuneate, and entire at the base; the upper surface slightly rugose; under surface pallid, with very thick rib and nerves, and largely reticulated veins.

None of the individuals in this garden have hitherto shown any disposition to blossom; owing perhaps to the plant being so easily multiplied by division. All the green parts, on being rubbed, emit the peculiar smell of the drug sold under the name of Pucha Pát, which is also very like our shrub in the form, margins, and surface of the leaves.

I should have mentioned above, that the Baron Hügel informs me, that he has found a plant growing wild at Canton, which closely resembles that from Penang cultivated in this garden.

Whether *Marrubium odoratissimum Betonicæ folio*, J. Burm. Thesaur. Zeylan. p. 153, tab. 71, fig. 1, (*Marrubium Indicum*, N. L. Burman, Flor. Ind. p. 127), be our plant or not, it is difficult to say; but it strikes me that there is at least a considerable affinity between them.

H. C. Botanic Garden, 6th June, 1835.

Note on the Medicinal Properties of the root of the Mishme Teeta.—By W. Twining, Esq.

The powder of this root is of an intensely bitter taste, which is accompanied with a slight degree of a peculiar aroma. The sensation produced in the mouth subsides but slowly, and is more pleasant than any simple bitter. Judging from the taste, it does not possess much astringency; and this opinion is confirmed, by finding that neither the tincture nor the infusion is much affected by the solution of sulphate of iron. Four hundred and eighty grains of the root, when coarsely powdered, and macerated in proof spirit for five days, were found to have lost 180 grains. The residue of the above tincture, when dried, amounting to 300 grains, was macerated for 30 hours in distilled water, and only 26 grains were found soluble in water; as the residuum, when dried, weighed 174 grains. The maceration in water was not continued longer than 30 hours, because fermentation had commenced, the weather being very hot at the latter end of May.

If we may be allowed to pronounce an opinion after trying the effects of the powder, and of the tincture, in 17 persons, this medicine is highly deserving of attention. The persons on whom the trials were made were chiefly patients who were suffering from different degrees of debility, after the subsidence of acute diseases; and one was a patient who was of a scrofulous habit, and reduced to the lowest stage of debility, by external suppuration of great extent. The effects of this medicine as a bitter, and its influence in restoring appetite and increasing the digestive powers, are very remarkable, and it may be said to possess all the properties of our best bitter tonics. It has seldom appeared to have the effect of constipating the bowels; but in this and many other respects, I consider further trials necessary to ascertain fully the medicinal properties of this drug.—*Transactions of the Medical and Physical Society of Calcutta*, Vol. VIII. Part I.

Calcutta, 5th June, 1835.

Notes on Cassia Lanceolata, or the Plant which yields the true Senna Leaves of the Calcutta Bazars—By N. Wallich, Esq., M. D.

Cassia Lanceolata, Forskäl, Flor. Ægypt. Arab. p. 85.—Lamarck, Encycl. Bot. vol. 1. p. 646, t. 332, f. 3.—Colladon, Hist. Nat, et Med. des Casses, p. 93, t. 15, f. C.—De Candolle, Prodr. Syst. Nat. Regn. Veg. vol. 2, p. 492.—Linnei Syst. Veg. cur. Sprengel, vol. 2. p. 339.—Nees von Esenbeck and Ebermaier, Handb. der Med. Pharmac. Bot. vol. 3. p. 205—Wallich, Cat. Herb. Ind. Or. n. 5318*. c. (in folio 204).

Cassiæ species angustifoliæ et ligustrinæ prox. Herb. Madrasp. Wall. loc. cit. a.—*Cassia ligustrinoides*, Herb. Wightian. Ibid b.

Cassia acutifolia, De Lile in Descr. de L'Egypte, Hist. Nat. tom. 2. Botanique, p. 219, t. 27, f. 1.

Senna officinalis, Gærtner de fruct. et semin. vol, 2, p. 312, t. 146.

Cassia Senna, Roxburgh, Hort. Beng. p. 31.—Ainslie, Mat. Med. of Hindoost. p. 43, (2d edition, vol. 1. p. 390; vol. ii. p. 249).

Senna Leaves, Fleming, Cat. of Ind. Med. Plants and Drugs, in Asiatic Researches, vol. ii. p. 109.

The above synonymy might easily have been enlarged to a much greater extent, if my object had been to attempt a detailed history of Senna, and of the two species of Cassia which are now known to produce that leaf. But I wish to limit these notes solely to an account of the plant which yields the drug commonly sold in the bazars throughout Hindustan, and more particularly those in Calcutta; and with this view I have confined myself to a quotation of such only, among the nu-

* By mistake I wrote Forst. instead of Forsk. in this lithographic catalogue.

merous authorities which presented themselves, as treat of the plant and drug in a more or less botanical respect, or with particular reference to this country; and even of these I have only noticed such as appeared to me of use to my brethren in the profession in India, and which I was able to consult personally. I have likewise thought it unnecessary to swell this little memoir by extracting from the works of Fleming, Ainslie, and others, what relates to the Indian names of the drug, its uses among the natives and the like; because I could have offered nothing more than a stale repetition of the information given by those authors.

It appears from Dr. Roxburgh's Hortus Bengalensis, that the plant was first introduced into the Botanic Garden of Calcutta in the year 1800, by the Rev. Dr. Carey. I am unable to say what result attended its culture at the time, but it may be concluded, from the circumstances of the plant not existing in the garden in 1808, and disappearing afterwards altogether for many years, that considerable difficulties were experienced in preserving it. In Roxburgh's valuable MS. Synopsis Floræ Indicæ the plant is introduced under the same name which it bears in the Hortus Bengalensis,—namely, *Cassia Senna;* and a specific character is added, which establishes beyond a doubt its identity with our *Cassia lanceolata.* He says, however, that the plant is "a native of the interior of India as well as Arabia, &c." of the correctness of which assertion I must express a serious doubt. In quoting Willdenow's edition of the Species Plantarum of Linnæus for his plant, a question naturally arises: which of the two, if not more, species of Cassia which are confounded there under the name of *C. Senna,* was actually meant by Dr. Roxburgh? Taking the species as he found it in Willdenow, the extensive geographical distribution to which I have alluded is, strictly speaking, true; but, as I before observed, the species which Roxburgh had before him was undoubtedly *C. lanceolata,* the true and genuine Senna plant of Asia Minor, which plant most unquestionably does not grow wild in the interior of India, nor in any part of the East Indies.

There is another species of Cassia which produces Senna leaves, and is called by Colladon *C. obovata.* It is distinct from ours, although for a long time it was confounded with it by Linnæus and others. This, too, is a native of Asia Minor; but does it not also grow in India? Both Colladon and other botanists cite Burman's *C. Senna,* which is decidedly an Indian production, as a synonyme; but I suspect they are wrong in so doing; in other words, I am inclined to consider Colladon's and Burman's plants as two different species, belonging to different countries. Roxburgh has a plant which he calls *Senna obtusa,* Flor. Ind. vol. 2, p. 344, and for which he quotes Burman's *C. Senna*; and this plant, judging from Roxburgh's excellent description as well as from

its place of growth, (Seringapatam), and lastly from native specimens which I have myself had an opportunity of examining, I believe to be a distinct species from the Egyptian *C. obovata*, and which I suggest may be called *C. Burmanni*. I must observe here, that *Cassia Senna* has not been introduced into Roxburgh's printed Flora Indica, although it is inserted both in his Hortus Bengalensis and the MS. Synopsis quoted above; but his *Senna obtusa* is mentioned in all three works, (under the genus *Cassia* in the two last).

There are, then, two species of Cassia which undoubtedly produce the Senna of commerce, both being exclusively natives of Egypt and Arabia; and a third distinct species, which belongs to the continent of India, is said by Roxburgh to yield a substitute for that article. The following is a synoptical view of them all.

1. *Cassia lanceolata*, Forskäl, produces the best sort of leaves, and is the subject of my present observations.

2. *Cassia obovata*, Collad. loc. cit. p. 92, t. 15, f. 1, (with exclusion of the citation from Burman, which belongs to the following species).

3. *Cassia Burmanni.* Wall.—*C. Senna*, Burm. Fl. Ind. p. 96, t. 33, f. 2.—*Cassia vel Senna obtusa*, Roxb, locis cit.—*C. obovata*. Wight, Herb. (non Collad.) in Wall. Cat. Herb. Or. 5319 a.—*C. Senna*, Herbb. Madr. et. Heyn. Ibid. b. et. c.—*C. Senna* Hb. Russ. Ibid. d. The plant which I gathered on the banks of the Irawaddy at Paghamew (Ibid. e.) is probably this species, though I cannot speak with positive certainty, as neither my Burmese Herbarium nor my manuscript notes respecting it are with me in this country. This species has not been found in Hindustan proper. It would be very desirable to try still further the efficacy of its leaves; and I beg to recommend the subject to the consideration of those who may have the means of making the experiment.

About eight years ago I succeeded in raising a number of plants from seeds found in pods among a batch of Senna which had recently arrived from Arabia. They proved to be Forskäl's *C. lanceolata*. Some difficulties were experienced at the commencement in preserving the plants and making them produce good seeds; but they were gradually surmounted, and, we have at this time (August, 1834), several plots of land in cultivation with the species; the greatest proportion of the plants being in a healthy and vigorous condition, full of flowers, and showing successive crops of ripe pods. The unusual degree of heat during the late dry season sensibly affected some of the individuals, by causing a disease in the root which killed them during the rains; still our crop is far better than I had any ground for anticipating: a good quantity of seeds has already been obtained, and a further supply remains still to be reaped, which will enable us to raise a much larger proportion of plants next year. The mode of cultivation which has

been found to answer best is to transplant the seedlings after they have acquired a height of about 6 inches, at a distance from each other of 3 feet, in slightly raised beds or patches of open ground, previously well cleansed from weeds and enriched by the addition of some vegetable mould. We sow the seeds in the month of November; germination commences in about twelve days, and the transplanting takes place in February; after which the plants grow luxuriantly, provided they are watered during the hottest days of April and May. Upon the whole, it has been found, that shading of any kind does more harm than good; and although a number of the young plants perish in their tender age from the excessive heat, yet by constantly supplying their place with fresh seedlings no sensible loss has occurred in the end from that source. The plants begin to blossom in April, and they continue producing successive crops of flowers and fruit until the cold weather begins to make its first appearance early in October, soon after which the plants die away; very few individuals surviving a second year.

Mr. Twining having with his accustomed liberality undertaken to ascertain the quality of the Senna leaf produced this year at the Botanic Garden, I am enabled to annex his very satisfactory report to this paper. It is proper, however, to observe, that the leaves furnished to that gentleman were gathered during the rainy season, in the months of July and August,—probably the most unfavourable of all for securing their active principle pure and undiluted, not only because the sap of the plant is then at its fullest rise, and necessarily modified by the continued production of flowers and fruits, but also because the drying of the leaf without the aid of artificial heat (as has been the case in the present instance), is a matter of doubtful effect. I am, therefore, warranted in saying, that had the leaves been collected in the dry weather, as I will take care they shall be next year, they would probably have proved superior to the Senna procurable in the Calcutta bazar.

Some explanation may perhaps be necessary for my offering a detailed description and coloured figure of a plant, which is already known to the world, in both respects, chiefly by the labours of De Lile in the superb French work on Egypt. But independent of the account there given being necessarily short and succinct, although illustrated by a most beautiful engraving, the work itself is so very expensive and scarce in this country (I believe it does not exist any where except in the Library of the Asiatic Society of Calcutta, at least on this side of India) that few only can have access to it. I have had the advantage of examining the plant leisurely in its various stages; and as my object is to furnish the Medical profession in India with the means of identifying a plant yielding one of the most extensively useful articles of Materia Medica, I trust I shall be excused even if I had nothing to offer but what had been furnished already from other sources.

The plant is 3 to 4, rarely 5 feet high; erect, branchy, of an elegant rounded form and aspect, and of an uniform pallid glaucous colour, corresponding well with the elegant clusters of large pale-yellow blossoms, which are produced in abundance during several months in succession; the whole forming an object of great beauty, not surpassed by any of the smaller species of the extensive and difficult genus to which it belongs. Root long, woody, tapering, perpendicular, sending forth few branches only; annual, rarely biennial. Stem cylindric, as far as an inch thick at the base, together with the thicker branches covered with a rust-coloured slightly scabrous epidermis, which on close inspection is found marked with minute parallel fissures. Branches round, pale-green, unequally and obtusely angular, very slightly flexuose towards their end, which, as well as the leaves, are glaucous and perfectly opaque; while young there are a few short sub-adpressed hairs on both sides of the leaflets as well as on the branches, which disappear by age. Tender shoots covered with much grey pubescence. Leaves petioled, pinnate, spreading, 1 or 2 inches distant from each other, scattered, from 6 to 10 inches long. Common petiol cylindric, slender, about 2 inches long, with a narrow furrow on the upper side; its base swelled and gibbous below. About the middle on the upper side, across the furrow, is seen a slightly elevated line covered with short, minute, brown evanescent hairs; this is also the case between the opposite leaflets on the slender, straight rachis, which ends under the terminal pair of pinnæ with a short, small and deciduous euspis. Pinnæ exactly opposite, in 6 to 10 pairs, spreading, 1½ to 2 inches long, slightly increasing in length from the base of the compound leaf to its apex, narrow or linear-lanceolate, tapering-acute, the midrib ending in a very minute point, margins gently decurved, base a little unequal, the upper half being acute, the lower a little broader and blunt; of a thickish, almost fleshy brittle texture, flat, very pallid and glaucous; both sides, especially the lower, have a number of minute adpressed short hairs, which disappear by age; the upper side is marked with some oblique capillary nerves, the lower by a very slender whitish rib. Partial petiols very short, measuring scarcely a line in length, cylindric. Stipules small, fleshy, opposite, spreading and recurved, withering, lanceolate, acute channelled, smooth, with an oblique semicordate base, the outer side of which is thicker than the rest, rounded, concave below; within the base are a number of black, short, subulate loosely attached and deciduous hairs or ciliæ. Racemes solitary in all the upper axils, peduncled, erect, somewhat incurved, as long as the leaves, bearing about 20 large bright yellow or gold-coloured, inodorous, short pedicelled flowers. Common peduncle one-third longer, and considerably thicker than the petiol, cylindric; rachis somewhat flattened and waved; pedicels one-flowered, very short, with a joint at the middle, and thence

thickening and clavate. Bracte exceedingly thin, membranous, pellucid, obovate, obtuse, concave, embracing the oblong and obtuse flower bud with its pedicel, adnate at the broadish base, falling off before expansion takes place. Calycine segments oblong, obtuse, concave, about ¾ of an inch long, very thin and delicate, recurved, caducous. Corolla of an uniform pale-yellow gold colour, spreading, twice as long as the calyx; petals unequal, caducous; the uppermost oblong-cuneate, sessile; the others obovate, and supported on very short claws; ¼ of an inch long, many times broader than the setals; they are all obtuse, somewhat triplinerved, finely reticulated on the outer surface, with slightly elevated nerves and veins. Anthers very unequal, of two kinds; three sterile ones very short and small, placed under the narrow upper petal, subsagittate, retuse; seven are fertile, linear, with sagittate bases and oblique biporous apex; of these, five are straight, much longer than the former; the one under the pistil has a longer filament than the others; two are curved and very long, reaching above the middle of the lateral petals. Pistil curved, longer than the stamens; ovary linear, covered with grey adpressed pubescence, margins swelled, the sides marked by eight little protuberances caused by the ovules; base supported by a short, fleshy, pubescent pedicel; style bent downwards, cylindric, except at the base, which is slightly compressed; stigma minute, acute. Pod oblong, flat, almost foliaceous, pendulous, before maturity glaucous, and with a number of short adpressed hairs, afterwards almost smooth, of a dark brown colour, shining on the bloom being rubbed off; 1¼ inch long by ¼ in breadth; oblong, slightly curved or scymetar-shaped; one of the finely elevated margins being longitudinally convex, the other concave; very obtuse and obliquely cuspidulate at the end; base rounded, and supported by a short pedicel; sides a little elevated along the middle, and marked across by slight swellings and depressions caused by the seeds; a number of parallel approximate capillary veins, originating from the marginal nerve, run obliquely across the sides towards the middle, forming reticulated anastomoses there as well as along their course by means of lateral veins. Valves flat, pale-ferruginous and a little pitted within. Dissepiments extremely thin and narrow, vanishing towards the margins. Seeds mostly eight, of a greenish-grey colour, shining, solitary in each cell between the dissepiments, flattened, triangular, obcordate, about four lines long; their base contracted into a short thick obtuse beak, from which a ridge ascends on each side towards the middle; the sides as well as the thick margins are scabrous from numerous unequal small protuberances. Funicle long, transversal, a little adscending, capillary, originating from the concave margin of the pod, and inserted into one side of the beak of the seed, disappearing on the latter coming to maturity. The interior structure, indeed the whole pod, corresponds

entirely with the accurate description and figure given in Gærtner's work, quoted at the beginning of this paper.—*Transactions of the Medical and Physical Society of Calcutta*, Vol. VIII. Part 1.

NOTE.

I beg to refer the reader to Mr. Royle's valuable *Illustrations of the Botany of the Himalayan Mountains*, p. 186 to 188, and again p. 201, Tab. 37, for very important and interesting information respecting the plant and drug which form the subject of the above paper. It arrived in India long after I had presented my notes to the Medical Society, otherwise I should have given these substantial value by copious extracts from my highly esteemed friend's masterly work. His very accurate figure of the plant supersedes entirely the necessity of any being added to this paper.

N. W.

H. C. Bot. Garden, 7th Nov. 1836.

Addenda to the foregoing by DR. WIGHT; *being practical remarks on the Culture and Preparation of Senna in the Madras territories.*

MADRAS, *March*, 1837.

MY DEAR SIR,—As you requested, I have looked carefully over Dr. Wallich's notes on the *Cassia lanceolata.* With the exception of a few brief instructions for cultivation, I find it a purely botanical account, examining first the synonymy, and concluding with a minute and accurate description of the plant itself. A paper of that kind, coming as it does from the Magnus Apollo of Indian Botanists, leaves, so far as it goes, no room for remark. Since, however, it is your intention to reprint it in the *Madras Journal*, the following additions may prove useful to those, who either are, already, engaged in its cultivation, or who may contemplate speculating in that way: and here I may remark that, considering the ease and certainty with which this drug can be raised and prepared for the market, and its vast consumption both in India and Europe, it seems to promise a very large return to the speculator. The consumption in Europe alone is stated by Mr. Royle, (*Illustrations of Botany, &c.*), to amount to four millions of pounds, that of India it may be difficult to determine, but it is well known that the natives are in the habit of using largely the indigenous, broad pointed leaved kind, though said to be much inferior, which would, as a matter of course, give place to the better sort, if as easily procurable. This I think would soon be the case, if the cultivation was extended, as it has already become so completely naturalized in the Tinnevelly district, as to be met with, in many places, as a common weed. It possesses besides the power of resisting heat and drought to an astonishing extent. I have seen it, during the hottest season, in full bloom and luxuriance, on old stone walls, and on soils so dry that no other herbaceous plant could survive, and where vegetation, in the arboreous plants, seemed nearly, if not altogether, arrested by the heat and long prevalence of strong land-winds. This fact (as shall be afterwards shown) is well worthy of attention.

In Tinnevelly, the only district, I believe, in Southern India, where it is cultivated to any extent, the soil employed is of a grey alluvial kind, or such as, at some former period, has been under wet cultivation, consisting of a mixture of sand and clay. I also saw a field of it in the bed of an old tank, the soil of which was such as above described.

The ground is first well ploughed, to loosen it thoroughly, and clear it from weeds. The sowing usually commences in December, towards the end of the rains, to give the seed the advantage of the last showers of the season to make it vegetate. It is sown in rows about 18 inches or two feet apart, by dropping two or three seeds into holes about an inch deep, and a foot and half distant from each other. If rain falls, nothing further is required; if not, they are watered two or three times to promote germination.

When the plants have attained the height of two or three inches, the ground is loosened about the roots and well weeded. Should the season prove very dry, and vegetation seem to flag, they are again watered: the rule being, that the larger the leaves the better the quality; hence they are classed into first, second, and third sorts, according to that criterion. In about six months the leaves are considered fit for gathering, which is known by the spike of flowers being produced, but the flowers not yet opened. Three gatherings are taken, the two last at intervals of ten or twelve days; when the crop is finished, and the plants no longer considered capable of producing a marketable article; they are then allowed to ripen their seeds for next season. Some skill is required in gathering, to effect that operation economically, and at the same time without injuring the plants. The Senna bears a pinnate leaf, that is, one having a centre stalk with a number of leaflets (6 to 10) on each side. The object is to remove these, leaving the stalk attached to the bush. To accomplish this the lower end of the stalk is gently laid hold of, from below, between the finger and thumb, and the leaflets stripped off into the hand, by drawing the fingers along the stalk. In this way the bushes are rapidly cleared of their foliage, and no unintentional admixture of pods or other impurities can possibly occur. In about twelve days the second crop of leaves is fit for gathering, and in twelve or fourteen days more, the third and last is plucked.

The most important part of the process yet remains—that of drying—for, unless properly dried, both its commercial value and medicinal properties are deteriorated. Two methods have been tried, namely, exposure to the heat of the sun and to a current of air in a dark room. The former is said to be the method pursued in Egypt, the latter is the plan adopted in Tinnevelly; at least so I was told, but, at the same time, with such evident reluctance, as to leave a doubt on my mind of its being really a true statement. I have now, however, no doubt on the

subject, for, on examining two specimens, one from Bombay, the other from Tinnevelly, the difference was such as to prove, not only the truth of the statement, but the infinite superiority of sun dried leaves. The colour of the Bombay or Egyptian sample was a very pale green, nearly white, the leaves narrow, thick and leathery, or coriaceous, somewhat brittle, and having the smell of well prepared hay. The Tinnevelly one, was of a light pea green colour, very thin, membranous (from excessive luxuriance ?), flexible, and having a sour, vinegar-like smell, as if it had undergone the acetous fermentation while drying. Another indication of the same thing may be found in the great loss of weight the latter sustains in keeping. Again—samples of two sorts of Senna raised in this country from Tinnevelly seed, the one dried in the shade, the other in the sun, were infused in equal quantities of boiling water; the former produced a pale, the latter a deep purplish brown, infusion, corresponding in these respects with infusions of Tinnevelly and Egyptian samples. The former is less active, soon decomposes and acquires a sour smell and a muddy opaque colour, while the other retains for many days, under similar circumstances, its transparency, and without undergoing decomposition. These facts, I think, are quite conclusive, and show, in a striking point of view, the advantages of sun drying, considered in relation to medicinal properties only. But that is not all, it is well known that Egyptian Senna is largely adulterated, but is notwithstanding a more efficient medicine than the pure Tinnevelly drug, a difference, which the preceding experiments prove to be, partly at least, attributable to the mode of drying, though other circumstances may contribute to produce this effect. Is the difference altogether attributable to the mode of preparation ? or partly to the Egyptian Senna being adulterated with more-active ingredients ? or to the operation of some other cause yet undiscovered ?

These are questions of importance, and merit the fullest investigation, both in a medical and commercial point of view. If the comparative inactivity of the Tinnevelly Senna is owing to the first cause, the cure is simple, and the advantages, commercially, very great, since the cost of preparation, both in time and outlay, must be materially lessened by the rapid and unexpensive process of sun drying, as compared with the slow and more costly one of fitting up dark apartments. If it is in any degree owing to the admixture of other kinds of Senna leaves, we have an indigenous species to supply them; and, lastly, if owing to the quality of the soil or culture, the subject still remains for investigation.

I shall now make some remarks on what I consider the defective points of the Tinnevelly mode of cultivation, and suggest some alterations tending to diminish the cost of production, and probably to improve the quality of the produce.

The lands appropriated in that district to the culture of Senna, are of a very expensive description, while it does not by any means appear certain that they are the best, since, by giving a tendency to excessive luxuriance, it is probable the due elaboration of the active principles of the plant is prevented, and mucilage formed; to which its diminished activity and greater tendency to fermentation may be mainly owing. Bearing in mind its power of resisting heat and drought, it will perhaps on this account be found, that the much cheaper, light sandy soils of the sea coast, and along the banks of rivers (now extensively appropriated to the cultivation of Indigo) are better adapted for its culture. The similarity, indeed, in many respects, of the Indigo plant is such, as to give us reason to believe, that any soil found suitable for it, will answer for Senna. Commercially speaking, it is of importance to determine, whether the drug produced on cheap and easily wrought soils, has its active properties increased or diminished. I would, therefore, recommend attention to this subject, since, if the former is found to be the case, it will probably materially diminish the cost, and fit it for the consumption of the Indian markets. The Tinnevelly Senna being nearly 500 per cent. dearer than the Egyptian or bazar Senna.

I have mentioned above that only one crop, of three gatherings, lasting through a period of about one month, is procured from each plant, after which it is no longer considered fit to produce a marketable article. Mr. Royle informs us that he raised at Seharunpore some plants from seed picked from a parcel of bazar Senna. A figure of the plant, proves its identity with the one cultivated in Tinnevelly, while its medicinal properties were ascertained by experiment, to be equal to the best any where grown. He, in collecting the crop, in place of gathering the leaves as practised here, cut down the whole bush. Some sown early (in March) " were cut down three different times, and always threw out a profusion of new branches, so that several crops were procured from the same plant in one season." The vegetation of some that was sown later, seemed only stopped by the accession of the cold weather. A combination of these plans might prove eminently productive, for, by sowing earlier, say in August and September, the first crop might be gathered in February or March, the plants might then be cut down, the soil slightly ploughed and manured between the rows, and watered; when a second crop might be expected about the usual time of gathering the first, according to the present practice; and, perhaps, as many as four crops might thus be obtained from the same roots, as they would be extending and strengthening after every cutting! This is the method adopted with Indigo, and I can see no reason to apprehend failure in the case of Senna, while it might be the means of effecting so great a reduction in the cost of production, as would enable it not only to compete with on equal terms, but even to undersell, the Egyptian article in this

country, and, from its greater purity, give it a decided advantage in the highest market where it now brings a very high price.

In conclusion, I beg to add, that, though these notes are somewhat hurriedly written, they are not the suggestions of the moment. It is now a year since I had an opportunity of inspecting the Tinnevelly plantations, and I have since then repeatedly thought of drawing up a much more elaborate account of this cultivation than the present. Brief, however, as these hints are, I believe them amply sufficient, the simplicity of the culture of the plant, and of the preparation of the leaves, rendering more detailed instructions unnecessary : while the mere circumstance of having called attention to the subject, pointing out the advantages likely to accrue, will I hope prove an adequate stimulus to those who have the opportunity of extending the cultivation of this article of almost general consumption. India now imports perhaps not less than between three and four hundred thousand pounds weight of Senna annually, of which in 1831 she re-exported to England upwards of 200,000lbs., the whole of which she might, with ease, produce within her own territories, and mostly from lands now lying waste, and with the additional advantage, that the collection and preparation would afford employment to all classes of cultivators, at those seasons when most other field labours are at a stand.

With respect to the indigenous Senna (*Cassia Burmanni Wall.*) I fear it is not so well known as it ought to be among Europeans, since it possesses very considerable medicinal properties, and is much used by the natives; who, to increase its activity, add a small portion of castor oil to the infusion, much in the same way as we add Epsom salts. It is a common and widely distributed plant in arid pastures and wastes, but by no means a conspicuous one, from the circumstance of its lying flat on the ground. In the hope of making it somewhat better known, I shall endeavour to procure recent specimens, and prepare a figure for your next number, which is the more desirable, as it may generally be procured in almost any part of the country, and might prove a useful substitute for the more approved lance-leaved species; or may perhaps be advantageously combined, as in Egypt, on the well known principle, that two medicines, possessing similar properties, act better in combination than either separately. Leaving this point, however, to be settled by those who have opportunities of subjecting both kinds to the test of experiment,

I remain, &c.

Robert Wight.

To R. Cole, Esq. Sec., &c.

ON THE AMERICAN SUMACH.*

The American Sumach, of which an experimental cargo is now on its passage to Liverpool, is the product of a tree which grows abundantly in many parts of South America, and possesses properties which render it decidedly more valuable, both to the Dyer and Tanner, than either Oak Bark, Catechu, Kino, Sumach, or the best Aleppo Galls. It contains, according to the able and scientific analysis of Mr. Samuel Rootsey, of Bristol, on a mean of two experiments, 76.25 per cent. of soluble or extractive matter, while Galls yield only 59.166645, Sumach (common) 40, Kino 40.4167, Catechu 67.08335, and British Oak Bark 30 per cent. Its most important constituent, however, in a commercial point of view, is *tannin*, or that principle which, by its union with animal matter, constitutes leather, of which the same experiments shew it to contain a mean of 51.1680 per cent. while the best Aleppo Galls yielded only 35.45835 per cent., Sumach 0.95834, or less than 1 per cent. and the best British Bark 13.4167 per cent. A tabular view of the results of Mr. Rootsey's experiments may be seen in Jameson's Edinburgh Philosophical Journal, and an abstract of these results in the Gardener's Magazine for August, 1834, under the name of *Dividivi*.

The substance has been largely and profitably employed in the tannery of Mr. John Nethersole, near Kingston, Jamaica, for some years past; and, from trials which have been made in England by skilful professional Tanners, it has been ascertained that one part of the American Sumach is equal to four pounds of the best British Oak Bark, and tans the leather in two-thirds less time; whence there results a gain of not only two-thirds of materials, but also of two-thirds of time. To the Dyer it will prove still more valuable—while Chemists will find their advantage in substituting it for Galls in the manufacture of Ink, in forming ointments for the cure of hæmorhoidal complaints, &c. &c. Taking the per centage of tannin as a standard of comparison, the intrinsic value of the American Sumach is equal to 1.443, or about 1½ of the best Aleppo Galls—hence the market value must always be estimated from the current price of that article.

Persons wishing to make trial of this new article, are requested to apply (post or carriage free), to Messrs. Vianna and Jones, Liverpool, to whom the cargo is consigned; to Mr. Samuel Rootsey, Chemist, &c. Bristol; to Messrs. Balkwill and Sons, Chemists, Old Town-Street, Plymouth; or to Dr. Hamilton, late Secretary to the Royal Devon and Cornwall Botanical and Horticultural Society, by whom every informa-

* See page 338.

tion required will be furnished, and with whom samples may be seen. As the quantity expected is but small, and the arrival of the cargo may be daily looked for, those who wish to become purchasers are requested to be early in their applications.

Plymouth, October 3d, 1834.

The *Cæsalpinia coriaria* varies in size according to the richness of the soil from a shrub to a large timber tree; the timber of which is valuable for many purposes of domestic economy and for building. It grows in the *hottest*, most sandy and arid soils, in which it appears to thrive better than in colder situations. In hot situations plants raised from the seed will flower in the third year of their growth, and will perfect their pods in the following year. In Carthagena, December and January are the flowering months, but the plants raised from seed which I sent to Jamaica in 1829, and which was sown sometime about the month of October, flowered for the first time in August, 1822,* and in the same month in the following year after flowering, the branches, which are slender, were bent down with the weight of pods. In Carthagena the pods are left on the trees till the high winds in March bring them down, when they must be gathered and housed before the April rains commence. From the experiments made on Oak bark however by Sir Humphry Davy, I should be inclined to think they would be found richer in the tanning principle if gathered by hand about the full moon of the month in which they attain their full growth, but before the sap has begun to descend, and the green colour to give place to the Mahogany hue of maturity. Oak bark is found to contain one quarter more tannin in spring than in autumn. The tannin resides wholly in the brittle exterior coat of the pod, all the rest being comparatively worthless; hence after dyeing, the pods should be ground in a mill and the refuse (amounting to one-fourth of the whole) separated by sifting. This refuse, though not worth the expense of freight, may be applicable to many useful purposes for dyeing, &c. on the place of production. In times of scarcity the pods are eagerly devoured by cattle. While young and soft, the pods are punctured by a small active little winged insect of a greenish colour, which deposits its eggs within, where they are hatched, and the young insects bury themselves in the seeds, the farinaceous portion of which they live upon as in the accompanying specimens of hollow seeds. This insect is, as Mr. Loudon, to whom I sent some for examination, informs me, a species of *Bruchus* similar to that which preys on the seeds of the family of *Brassicæ*, but has not hitherto been described by any Entomologist. I have named it for the present *Bruchus Cæsalpiniæ*, or the Dividivi Bruchus. I

* Query, 1832.—Ed. Trans.

have frequently received it alive from Carthagena along with the seeds. A few specimens of dead Bruchi accompany this. How far the depredations of this insect are injurious to the pod itself must be determined by experiment.

In forming plantations of the *Cæsalpiniæ coriaria* the trees should not be closer than 18 feet; whence an English acre will contain 135; and taking the average weight of produce from each when in full bearing, at 100 lbs. the harvest will amount to 135,000 lbs. the nett produce of which when ground and freed by sifting from the refuse, should be at least 101,250 lbs. or 45 tons 4 cwt. and 2 lbs. a return fully equal to that of the cane, and obtainable from land unfit for producing sugar.—*Transactions of the Agricultural and Horticultural Society of India.*—Vol. III. page 92—94. W. Hamilton.

On the identity of the bark of the Strychnos Nux Vomica with the false Angustura of writers on Materia Medica.—By W. B. O'Shaughnessy, M. D., *Professor of Chemistry, Medical College, Calcutta.*

Few medicinal barks have ever attracted more attention than that generally termed the false Angustura. Introduced into Europe originally as the bark of the *Galipea febrifuga*, its poisonous properties soon denoted a different source. The *Brucea ferruginea* and *antidysenterica* were next suspected, and this erroneous idea continued to be entertained so long, that on an alkaloid being discovered in the bark in 1822, it was named *Brucine*, in conformity with the supposed origin of the bark: In 1823, however, it was ascertained that the bark in question arrived in Europe exclusively from South America, and not from the shores of the Red Sea, where the *Brucea ferruginea* or *woginoos*, is indigenous.

The question has continued at issue, from 1825 to the present period. In 1828 was published M. Fée's admirable work on the Natural History of Remedies; and this author, whose elaborate research is quite unsurpassed, describes the false angustura as " Arbor ignota, habitat in America meridionali." Dr. Duncan in the last edition Edinburgh Dispensatory, 1830, says, the tree from which the false angustura is obtained " is not yet known, but it is a native of South America, and therefore it is not, as formerly asserted, the bark of the *Brucea antidysenterica* which grows in Abyssinia."—p. 340.

In Dr. Thomson's last edition, 1833, p. 226, we find no further information than a brief allusion in a foot note to the existence of the spurious bark, and to Plamba's obsolete observations regarding its history and name.*

* Nor in the later edition of 1836 is anything new added.—*Editor Madras Journal.*

The first hint we meet of the true nature of this bark occurs in the valuable Manual of Materia Medica, by Vavasseur and Edwards, in which, p. 269, the authors observe,—" This substance, obtained from South America, is probably yielded by a strychnos yet undescribed, and not by the Brucea anti-dysenterica," &c.

Lastly, in Dr. Christison's unrivalled work on poisons, last edition, October 1835, p. 806, we find the author observing—" It was long supposed to be the bark of the Brucea anti-dysenterica, but the latest inquiries seem rather to point at its being the produce of a species of strychnos, and perhaps of the familiar species, S. Nux Vomica.

Such is a fair outline of the history of this bark up to the latest period. Since the last meeting of the Society I have been enabled to clear up all doubts on the subject, and to identify the false angustura as the bark of the nux vomica tree.

The subject was brought to my notice by my having been intrusted with the analysis of a crystalline substance supposed to have been prepared from the bark of the Rohun tree *(Swietenia febrifuga)*. My experiments shewing that the crystals were brucine with traces of strychnine, the presumption immediately arose that the bark from which the crystals were obtained was the bark of the strychnos nux vomica, the only poisonous strychnos abundant in the Bengal jungles with which the natives are familiar.

Specimens of the bark from which the crystals were prepared, of the *kuchila* (native name of nux vomica bark) from the bazars, and from a strychnos nux vomica tree in the Botanical Garden, kindly supplied by Dr. Wallich, were readily procured and compared with each other—all were found identical in their physical and chemical composition, all yielded *brucine* and traces of *strychnine*, and all produced the same toxicological effects.

On a reference to the characters assigned by the authorities I have quoted as distinctive of the false angustura, we find the following chemical tests—1st, nitric acid, which changes the interior of the bark to a blood-red colour, and causes the red external exuberance to become green; 2dly, the prussiate of potash which causes in an infusion of the bark a faint green colour; and 3dly, sulphate of iron, which changes the infusion to a deep green. To all these re-agents the nux vomica bark presents the described indications.

The most remarkable and curious of the external characters of the nux vomica bark, and one in itself an indisputable proof of its being the false angustura, is the singular red exuberance which occurs on the outer surface of the specimens now presented to the Society.

This red exuberance was the first property of the spurious angustura bark which attracted attention in Europe. M. Fée states that it frequently happens that " the false angustura has a spongy exuberance of a very beautiful rust colour, and that M. Pelletier who had analysed it had by mistake described it as a lichen of the genus Chiodecton.

M. Fée denies that it is a lichen, and considers it as the result of a leprous disease of the bark, the stages in which he clearly and correctly describes. It commences, he states, by little regular prominences, surrounded by decayed epidermis. These tubercles increase in size, become irregular in outline and confluent, and pass through the several shades, between a clear yellow and iron-rust colour.

When the disease is of long standing, the part affected acquires considerable thickness, and is much deformed. No trace of organization can be detected in it by the naked eye. Examined by the microscope, it is found to be composed not of cellular tissue like Cryptogamic plants, but of true vascular tissue as in the Phanerogamic class,—a fact sufficient to shew that the exuberance is not a lichenoid production.

It is altogether unnecessary to add a minute description of the nux vomica bark, since Fée's account of it under the name of the false angustura, is as accurate as possible.

I trust the identification of the long doubtful false angustura may be of practical therapeutical utility, as well as pharmaceutical interest. It is extremely rich in brucea, an alkali of exactly the same properties as strychnea but fortunately but of one-twelfth the energy of that poison. According to the recent experiments of Andral, Magendie and and Chevalier, brucea is extremely effectual in the cure of paralysis, atrophy, chronic rheumatism, sciatica, and several analogous affections. I have much hope, too, that it will be found useful in the treatment of intermittent and remittent fevers. The bark will now become an article of some consequence as an export, since the preparation of brucea as a medicine was limited or almost prevented by the rare and casual supply of the bark, from which it was obtained. In fact, brucea was only to be found in the museums as a curiosity. In the shops its price was as high as 40 shillings the ounce—hence the virtues of the remedy were only ascertained, its benefits not diffusible. We can now prepare it in Bengal for three or four rupees the ounce, and I have no doubt its consum ption will become very extensive.—*Quarterly Journal of the Medical and Physical Society of Calcutta*,—No. 1, January 1837. *October* 22, 1836.

Catalogue of Plants collected at Bombay.—*By* JOHN GRAHAM, Esq.
(Concluded from page 183, *No.* 14*)*.

172. Datura *fastuosa*. Common.—173. Dracæna *ferrea*. In flower pots only.—174. Dimocarpus *litchi*. In gardens, though not common. It bears fruit here but not equal to that obtained from China.*—175.

* The *Litchi* forms the favourite fruit in Chinese deserts. It resembles somewhat the fruit of the Maple *(Acer Campestre)* in external appearance. The tree grows in a wild state in French and Danes' Islands, Whampoa.—EDIT. *Records*.

Dalbergia *arborea,* native name Carunj. A very pretty tree ; leaves deciduous in the cold weather.—176. Dalbergia *Sissoo.* Black wood used extensively in making furniture.—177. Dalbergia *scandens.*—178. Dolichos *tuberosus.*—179. Dolichos *cultratus.* A species of Dolichos is much cultivated and eaten like French beans, the *tetragonolobus.*—180. Dolichos *pruriens.*—181. Dioscorea *sativa.* Common yam.—182. Dioscorea *bulbifera.*—183. Diospyros *Ebenum.*—184. Daemia *reticulata.* 185. Dillenia *speciosa.*—186. Diospyros *montana.*—187. Diospyros *hirsuta.*—188. Daphne *Bholua.*—189. Dendrobium ? On the Ghauts.—190. Dombeya *palmata.* In gardens only.—191. Exacum *bicolor.*—192. Evolvulus *hirsutus.**—193. Euphorbia *Tirucalli.* Common milk bush. —194. Euphorbia *antiquorum.*—195. Euphorbia *tithymaloides.* Used for edgings, instead of box.—196. Euphorbia *neriifolia.*—197. Euphorbia *hirta.* A common weed.—198. Eugenia *jambos.* Jambler, rose apple.—199. Eugenia *Malaccensis.*—200. Erythrina *Indica.* A deciduous tree. It flowers in March and makes a very showy appearance.—201. Eupatorium *Zelonia.*—202. Eclypta *prostrata.*—203. Elephantopus *scaber.*—204. Feronia *elephantum.* Wood apple, a large handsome tree.—205. Ficus *Carica.* In gardens only.—206. Ficus *religiosa.* Pepul tree.—207. Ficus *Indica.* Banyan tree.—208. Ficus *elastica.*—209. Ficus *racemosa.*—210. Ficus *pubescens.*—211. Flacourtia *sapida.* In gardens only.—212. Flacourtia *sepiaria.* Elephanta.—213. Flacourtia *inermis.*—214. Guazuma *ulmifolia.*—215. Gardenia *radicans.* In gardens only, cultivated for its beautiful, white, sweet smelling flowers.—216. Gardenia *lucida.* Elephanta.—217. Gardenia *dumetorum.*—218. Gardenia *esculenta.*—219. Getonia *floribunda.*—220. Grewia *orientalis.*—221. Gomphrena *globosa.* In gardens only, cultivated for its flowers.†—222. Gloriosa *superba.* Common during the rains.—223. Guilandina *bonduccella.*—224. Gärtnera *racemosa.*—225. Garcinia *Cowa.* Common in the Concan.—226. Grewia *Asiatica.*—227. Gerardia *delphinifolia.*—228. Gmelina *arborea.*—229. Gmelina *Asiatica.*—230. Gossypium *herbaceum.*—231. Glycine *Sinensis.*—232. Galega *purpurea.*—233. Garuga *pinnata.*—234. Grislea *tomentosa.*—235. Hoya *carnosa.* Cultivated as an ornamental plant.—236. Hoya *viridiflora.*—237. Hyperanthera *Moringa.* Very common.—238. Helicteres *ixora.*—239. Hibiscus *populneus.* Bhendy tree.—240. Hibiscus *rosa Chinensis.* Cultivated as an ornamental plant.—241. Hibiscus *mutabilis.* Cultivated as an ornamental plant.—242. Hibiscus *Sabdariffa.* Iropille, used in making jellies, tarts, &c.—243. Hibiscus *esculentus.* Commonly cultivated.—244. Hibiscus *surratensis.*—245. Hibiscus *cannabinus.*—246. Hibiscus *tricuspis.*—247. Hedysarum *gyrans.* 248. Hedysarum *strobiliferum.*—249. Hedysarum *tuberosum.*—250. Hedysarum *vespertilionis.*—251. Hemidesmus *Indicus.*—252. Ixora *cocci-*

* Is this not a variety of E. *alsinoides*, a common plant in China ?—Edit. *Records.*
† Indigenous to China.—Edit. *Records.*

nea.—253. Ixora *parviflora.*—254. Ipomœa *Quamloquit.* Cupid's flower.*—255. Ipomœa *fragrantissima.*—256. Ipomœa *tuberosa.*—257. Impatiens *Balsamina.*†—258. Inula *Indica.*—259. Jasminum *Sambac.* Mogrel, native name. Extensively cultivated for its flowers.—260. Jasminum *odoratissimum.*—261. Jasminum *latifolium.*—262. Jasminum *undulatum.*—263. Jasminum *auriculatum.*—264. Justicia *picta.* Common in flower pots.—265. Justicia *nervosa.*—266. Justicia *bivalvis.*—267. Justicia *montana.*—268. Jonesia *pinnata.* On Salsette.—269. Jatropha *curcas.* Used for forming hedges.—270. Jatropha *manihot.* In gardens only, very rare.—271. Jatropha *multifida.* In gardens, as an ornamental plant.—272. Kydia *fraterna.*—273. Kyllingia *umbellata.* Grass.—274. Loranthus. Several species.—275. Lawsonia *inermis.* Used for forming hedges.—276. Laurus *cinnamomum.* In gardens only.—277. Laurus *Persea.* In gardens only.—278. Limonia *monophyllum.*—279. Limonia *trifoliata.*—280. Lagerstroemia *regina.* In the Concan.—281. Lagerstroemia *Indica.*—282. Lagerstroemia *parviflora.*—283. Lantana *purpurea.*—284. Lepidagathus *cristata.*—285. Menyanthes *cristata.*—286. Menyanthes *Indica.*—287. Mussaenda *frondosa.* On the Ghauts.‡—288. Morinda *Indica.*—289. Morinda *citrifolia.*§—290. Mirabilis *Jalapa.* In gardens.—291. Mangifera *Indica.*—292. Mimusops *elengi,* and 293. Mimusops *hexandra.* Both pretty trees commonly planted by Mussulmen around towns, such as Aurungabad, &c.—294. Murraya *exotica.* In gardens only.—295. Melia *azidiraltea.* Neem tree.—296. Myrtus *communis.* In gardens.—297. Maumea *America.* In gardens, rare.—298. Michilea *champaca.*—299. Momordica *charambee.* Commonly cultivated as an article of food.—300. Menispermum *cordifolium.*—301. Musa *paradisaica.* Plaintain.—302. Musa? On Ghauts.—303. Mimosa *pudica.*—304. Mimosa *cinerea.*—305. Mimosa *Arabica.* Babool tree; common; in extensive use as firewood.—306. Mimosa *scandens.* On the Ghauts.—307. Mimosa *Sirisa.*—308. Mimosa *glauca.*—309. Mimosa *dulcis.*—309. Morse *chinensis.*—310. Mentha *perilloides.*—311. Marsilea 4-*folia.*—312. Morus *Indica.*—313. Milhavia *tomentosa.* In gardens only.—314. Mesembryanthemum? In gardens only.—315. Nyctanthes *Arbor tristis.*—316. Nicotiana *Tabacum.*—317. Nerium *Oleander.*

318. Nerium *coronarium.*		
319. „ *coccineum.* Rare.	}	All cultivated as ornamental plants.
320. „ *antidysentericum.*		
321. „ *tinctorium.*		

322. Nymphea *lotus.*—323. Nelumbium *speciosum.*—324. Nauclea *orientalis.*—325. Oryza *sativa.* Common rice.—326. Ocimum *sanctum.* Planted at temples.—327. Ochna *lucida.*—328 Piper *nigrum.* In

* This plant is indigenous to Danes' Island, China.—Edit. *Records.*

† This species occurs in China.—Edit. *Records.*

‡ Abundant on French Island, Whampoa, China.—Edit. *Records.*

§ A native of China.—Edit. *Records.*

gardens.—329. Pladaa *virgata.*—330. Plumbago *rosea.*—331. Plumbago *Zeylonica.*—332. Physalis *angulata.*—333. Plumeria *acuminata.*—334. Periploca *esculenta.* A very pretty twining plant; flowers during the rains.—335. Perilla *ocymoides.*—336. Polyanthus *tuberosa.* Cultivated in gardens; worn by native women in their hair.—337. Parkinsonia *aculeata.* In gardens.—338. Poinciana *pulcherrima.* Common in gardens. It grows in abundance close to the caves of Ellora, near Aurungabad, but I suppose it has all been planted.—339. Portulaca *oleracea.*—340. Psidium *pyriferum.* Grown in gardens.—341. Punica *Granatum.* Grown in gardens.—342. Premna *integrifolia.*—343. Phlomis *Indica.*—344. Pedalium *Murex.*

345. Passiflora *fœtida.* In Gardens.
346. „ *laurifolia.* Do.
347. „ *minima.* Do.
348. „ *alata-cœrulea.* Do.

349. Pistia *Stratiotes.*—350. Pentapetes *phoenicea.* In gardens.—351 Pterospermum *acerifolium.*—352. Phaseolus *Mungo.*—353.—Polygonum *glabrum.*—354. Phyllanthus *bacciformis.*—355. Pandanus *odoratissimus.*—356. Prenanthes *sarmentosus.*—357. Quisqualis *Indica.* In gardens.—358. Rhizophora *Mangle.*—359. Rosa ? Several species in gardens.—360. Ricinus *communis.*—361. Ruellia *Zeylonica.*—362. Rottleria *tinctoria.*—363. Saccharum *officinarum.* Cultivated.—364. Smilax *aspera.*—365. Santalum *album.*—366. Solanum *tuberosum.*—367. Solanum *lycopersicum.*—368. Solanum *melongina.*—369. Solanum *nigrum.*—370. Solanum *jacquini.*—371. Sterculia *colorata.*—372. Sterculia *urens.*—373. Sterculia *foetida.* Poon tree. Grows to a great height in Malabar; masts are made of it.—374. Sphæranthus *Indicus.*—375. Sansevoera *Zeylonica.*—376. Sapindus *emarginatus.*—Sapindus *tetraphyllus.*—377. Spondias *Amra.*—378. Sesamum *Indicum.*—379. Sida *populifolia.*—380. Smithia sensitiva.—381. Spilanthes *alba.*—382. Salvadora *persica.*—383. Stemodia *ruderalis.*—384. Tectona *grandis.* Teak tree.—385. Tamarix *Indica.*—386. Turnera *ulmifolia.* In gardens.—387. Tradescantia *discolor.* In gardens.—388. Tradescantia *cristata.*—389. Triumfetta *annua.*—390. Thunbergia *grandiflora.* In gardens.—391. Tamarindus *Indica.*—392. Tagites *patula.* In gardens; worn by native women in their hair,—393. Trichosanthes *Anguina.*—394. Trophis *aspera.*—395. Terminalia *Catappa.*—396. Terminalia *alata.*—397. Terminalia *Bellirica.*—398. Tabernaemontana *dichotoma.*—399. Utricularia *stellaris.*—400. Ulmus *integrifolia.* Salsette.—401. Unona *longifolia.*—402. Vitis *vinifera.* In gardens.—403. Vitex *trifolia.*—404. Vernonia *arborea.*—405. Vernonia *anthelmintica.*—406. Verbena *sativa.*—407. Verbena *dichotoma.*—408. Viscum *compressum.*—409. Vangueria *spinosa.*—410. Vangueria *edulis.*—411. Vitmannia *elliptica.*—412. Yucca *gloriosa.*—413. Zingiber *officinale.*—414. Ziziphus *Jujuba.*—415. Zinnia *elegans.* In gardens only. 416. Zea *Mays.* Indian corn; extensively cultivated.—417. Zapania *nodiflora.*—*Records of General Science,* Nos. 21 and 22, *for September and October* 1836.

Account of the Province of Rámnád, Southern Peninsula of India. Compiled from the "Mackenzie Collection," and edited by the Secretary to the Royal Asiatic Society.

INTRODUCTION.

This province, the government of which is now administered by the British, formed in ancient times the greater part of the principality, or fiefship, of the *Sétu-pattis*, the chiefs or guardians of the passage leading from the continent of India to the island of Rámésware, and thence to the opposite coast of Ceylon, called Ráma's Bridge, or Adam's Bridge. These chieftains, dating their authority from the period of the establishment of a place of pilgrimage on the island of Rámésware, by the Great Ráma, claim an antiquity even higher than that of the Pándyans, or kings of Madura, but to whom, it would appear, that they were, in general, tributary, though now and then asserting and maintaining their independence. Of their history, however, we are not now to speak, but of the province as it was in the year 1814, when the data were taken from which chiefly the following account is compiled. It lies between the ninth and tenth degrees of north latitude, and the seventy-eighth and seventy-ninth of east longitude; is bounded on the north by the provinces of Tanjore and Pudukotta, on the south and east by the sea, and on the west by the districts of Tinnevelly, Madura, and Sivaganga; and comprehends an area of nearly two thousand five hundred square miles. Its general aspect is that of high and low lands, the latter having numerous artificial lakes, constructed for the purpose of promoting cultivation; the former exhibiting a variety of dry grain-fields, while the northern districts abound with extensive groves of Palmyra trees, with scarcely a vestige of jungle. The whole is divided into seventeen districts, comprising one thousand six hundred and sixty-eight towns and principal and subordinate villages, with a population, at the period to which we allude, of about one hundred and fifty-seven thousand.

FORTS, TOWNS, AND VILLAGES.

Rámnád,* the capital of the province, has both a fort and a town. The former is a fortification, the sides of which, from north to south, and from east to west, are each about half-a-mile in length, consisting of a single wall, strengthened with thirty-two bastions, built at equal distances from one another, and with one gate-way which is to the east. The wall is twenty-seven feet high and five feet thick, without a rampart, but with loop-holes, and surrounded by a ditch. This fort was built

* Properly, Rámanátha-púram, from Ráma, the god, or king of that name; nátha, a lord, and púram, a town or city.

upwards of two hundred years ago, by MOGHAVA RAGUNATHA SETUPATTI, who, at the same time, constructed the large reservoir, or artificial lake, that lies on the N. W. side. About two hundred yards from the gate stands the chieftain's palace, which is a spacious Gothic structure, surrounded by a high wall, within whose cincture is seen a great number of apartments, some of two and others of three stories high, whose fronts and portals exhibit some taste, according to the Carnatic style of architecture. In the grand hall, called Rámalinga Velasam, the chieftain, his wives, and his ancestors, are represented in a highly embellished manner; and, among a variety of other paintings and gildings, finely varnished, is a painting of the battle between the rájás of Tanjore and Rámnád, which happened in the year 1770. In the outer court, at the grand entrance, is the chieftain's kachahri;* on the south side, in the outer court, are large stables for elephants; and, on the north side, stables for horses. On the north-east bank of the reservoir is a small and beautiful Protestant church, with a burial-ground adjoining it, as also a vestry-house. A few yards from the western bank of the reservoir is the burning-place of the chieftain and his ancestors, where several grand tombs are erected to the memory of the latter. On the north side, between the walls of the fort and the reservoir, is a high cavalier, raised with earth, which commands an extensive and delightful prospect of the surrounding plains. A Roman Catholic chapel, which was built by Colonel MARTINEZ, in the year 1799, stands near the south-east angle of the fort, and nearly in the centre stands a small Hindú temple. The principal streets, which are few, are wide and airy; the others, which are numerous, are irregular and narrow. The houses are mostly thatched roofs.

The town of Rámnád is situated east of the fortress, from the gate of which a wide street leads, with two grand rows of bazars, regularly built. Here a market is held every Wednesday, when the people, from a distance of fifteen or twenty miles, bring in cotton, grain, and other provisions for sale. The town, and its suburbs, including Letchmapúram (a village situated to the north), are about three miles in circumference. At the east end of the bazars, where a road intersects, crossing north and south, are several detached houses, with gardens surrounding them, and a small mosque. These separate one part of the town from the other. There are, also, two or three other mosques, which, though not conspicuous, are by no means inelegant. Upon the whole, the streets are narrow and ill-contrived; the houses are moderately well built, and are upwards of two thousand three hundred in number; and the population exceeds eight thousand seven hundred souls, consisting of Musalmáns, Bráhmans,

* A hall of justice, an office.

and Sudras, and a few native Christians; many of the two former carry on a considerable trade in grain and other articles of import from Travancore, Ceylon, &c. There are no artisans here, excepting gold and silversmiths, braziers, and ironsmiths; the latter, about two hundred families, who are Musalmáns, reside in the town. The east part of the town is inhabited by manufacturers of chintzes and printed cloths.

Letchmapúram is seated east of the large reservoir of that name. It has a handsome Hindú temple, built about thirty-six years ago; and on the north-east of the reservoir stands a spacious and elegant chattiram,* or caravansery.

Kámúri, a fort lying thirty-one miles west of Rámnád, and thirty miles south by west of Sivaganga, is seated on an elevated rocky ground on the north bank of the Kúndár river, and commands a most delightful and extensive prospect. It is small, but of some strength, built of stone, of a circular form, with a double enclosure of walls, having an interval between them of about sixty feet; the outer wall is twenty feet high, and about four feet thick, without a rampart or parapet, but has nine bastions: the inner wall is stronger, twenty-five feet high, with a rampart, and seven bastions. On an eminence, to the south-west, is a redoubt. In the inner fort, a granary and magazine still remain; between the two walls, on the western side, is a well of very clear water cut through rocky strata, having steps on the one side descending to the bottom. This work appears to have been performed with great skill, though, no doubt, not without much difficulty, owing to the solidity of the rock.

About one thousand yards from the fort, on the southern bank of the river, the town of Kámúri is seated. A small Hindú temple stands on the north side, and a pretty wide street surrounds it. There are many more streets, but most of them narrow and crooked, with low thatched houses built of earth; a few, however, are covered with tiles. Almost in the centré stands a grand terraced house, belonging to a native, the elegance and situation of which afford an agreeable prospect. In the dry season the dust and heat are almost intolerable; and in the rainy season, owing to the black soil, the mire is so deep as to render the streets almost impassable. Some of the inhabitants here are very

* These chattirams much resemble the ancient hostelries of Europe. They are charitable foundations for the lodging and entertainment of a certain number of guests for a specified time; one day, three days, and sometimes longer. Some are founded merely for the relief of Bráhmans; others, for all classes of the natives; and some, for the accommodation and entertainment of Europeans. The late Rájá of Tanjore had one at which, for the space of three days, any European gentleman passing that way was most sumptuously entertained. Similar ones were also to be met with in other parts of the Carnatic but a very few years ago.—Ed. *Jour. R. A. S.*

opulent men, and many of them trade to a considerable extent in cotton, as it is in greater plenty here, and in the neighbourhood, than in any other part of the province. A great market is held on every Tuesday, when astonishing crowds of people come from the neighbouring districts for the purchase of articles to retail in the different villages. Cattle are also brought to this market for sale.

Armukamkotta is a fort that lies twenty-one miles north by east of Rámnád, on the road towards Trichinopoly, and three miles east of the lake of Rasingamangalam. It stands upon an eminence, having a gentle declivity to a river which runs by it to the north and to the east. This river has an impetuous torrent, and in the rainy season flows up to the walls of the fortress, and, inundating a large tract of land in its course down towards the sea, often proves injurious to the villages situated on it. The fort is denominated after its form of a hexagon, having six bastions at equal distances. It was built about one hundred and ten years ago, and appears, from the accounts respecting it, to have been a place of some importance. It is in good order, has a gate on the west, and a few wells of excellent water, which are now appropriated for the use of the garden that is made in it by the neighbouring villages : it is otherwise desolate and uninhabited.

At Mangalagúdi is a small ruined fort. This village is situated on the high road from Armukamkotta, and is chiefly inhabited by Musalmáns, who carry on a little trade. A market is held here every Thursday.

There are several other forts, but all in a ruined state, and almost levelled to the ground.

Tirupallani, a populous village six miles south of the capital, situated on a commanding plain, is highly distinguished as one of the sacred places of Hindú worship ; the temple stands on the east side of the village, and a rectangular reservoir is situated opposite to it. Two pavilions are raised on stone pillars ; the one adjoining the gate of the temple, the other to the east of the reservoir. The temple is surrounded by a high stone wall. The main street of the village is about two furlongs in length, and forty feet wide ; the south and east streets are inhabited by Bráhmans, and the north and west streets by the people attached to the temple, and other Hindús. This temple is dedicated to the god Jaganátha, and the festivals are celebrated annually in the months of April and July. In the north-west and south-west angles of the village, are two substantial stone pavilions ; and, on the north-east side, a reservoir of excellent water. A broad but shallow salt-water lake runs west of the village, which receives the surplus waters that flow from the interior parts of the country, especially from the kalingula, or sluice of the Chakkrakotta lake, the whole falling eventually into the Kottagudi river.

The pilgrims who resort to the temple at Ráméswara to pay their adorations, must, after performing their ablutions in the sea, first come here to worship.

Adiséta-tírtha is not a village, but a famed place on the coast, lying nine miles south of the capital; it is esteemed holy by the Hindús on account of its *bath*, which was found by Rama, who bathed here, on his expedition to the Isle of Lanka. The men generally bring their wives and families with them; but, in the event of the wife not being present, the priest gives the husband a piece of straw to roll round the little finger of his right hand, as an emblem of the wife. The act of washing here in the sea is a form of penance that they perform, from a general notion that, by doing so, they wash away all their sins. Devotees, and especially those of the Bráhman caste, who go on pilgrimage to the Isle of Ráméswara, must return hither to perform the enjoined rites of devotion, and the priests who attend here make a small collection from them, giving in return holy ashes to rub on their foreheads. The neighbouring villagers assemble here to bathe on certain days of the year; also on the days of the new moon, and particularly at the time of an eclipse either of the sun or moon..

Kílakarai, a populous sea-port and commercial town, situated nine miles south by west of the capital. It is inhabited by Muhammadans, many of whom are opulent, and carry on a considerable trade both by sea and land. The houses and granaries are finely built on the margin of the sea, from which it has a beautiful appearance. The circumference of the town is about two and a half miles; the streets are numerous, but narrow and ill-formed; the houses are low and have thatched roofs. A small Roman Catholic church is situated near the eastern skirts of the town, contiguous to which are the ruins of a Dutch factory. There are about eleven mosques, or rather tombs of some respectable Musalmáns who have died here, a few of which are very elegant in structure, especially one which stands about the centre of them, the cupola of which is covered with gold. The place abounds with very thick groves of Palmyra trees. It carries on a good sale in Padanír,* which the Musalmáns much esteem, and drink to excess. The inhabitants of this town follow almost every trade, and carry on an extensive manufacture of long cloths, both fine and coarse: upwards of a hundred boats belong to this port. The coast abounds with low rugged rocks, which are only seen above water at low tide; it is, therefore, dangerous for the passage of vessels, unless conducted by a pilot who is well experienced in these roads. Vessels pay for their anchorage here as well as in other parts. A sea custom-house is established here.

* A sweet beverage extracted from the Palmyra tree, similar to toddy, but with which is mixed a little chunam: when boiled, it becomes jaggry, a coarse kind of sugar.

Muttupetta, a fishing village on the coast, situated nine and a half miles south-east of Rámnád, is chiefly inhabited by Roman Catholics. There is a large Roman Catholic church in the centre of the village, dedicated to the Virgin Mary, and a priest resides here, who is a native of Goa. A few merchants belonging to this place reside at Periapatam, a village situate about one mile to the west. Eleven fishing boats belong to this port, which carry on a pretty good trade both in fresh and salted fish: the Muhammadan inhabitants here are chank fishers. The place is the occasional resort of European gentlemen, who come for the benefit of their health, and to enjoy the sea-breeze.

Vaidálai, a pretty populous village on the coast, situated thirteen miles east of Muttupetta, inhabited chiefly by Musalmáns and Shánárs,* the former carrying on a good trade. The houses are poorly built and very irregular. This is a noted place for a superior quality of the Choya-vér, which is the root of a certain plant from which is extracted a red dye. It grows spontaneously in these parts, and on an island opposite to this place. Considerable revenue is derived from it.

Autankarai, a sea-port, situated eleven miles east of the capital, at the mouth of the Vigay river, on the north bank, inhabited by fishermen; it has a spacious and well-built chattiram, surrounded by a strong wall. There are sixteen boats daily employed in fishing, and from this place, and the neighbouring villages on the coast, the town of Rámnád is well supplied with fish. Several vessels frequent this harbour at the proper seasons of the year to receive paddy and chanks for exportation, as well as the Choya-vér, which here also grows spontaneously to a great extent. Oysters are to be had in abundance, and are of good flavour. About two miles on the north-west lies Ullagenkolam. This place is distinguished for the excellent tobacco it produces, which thrives here extremely well, and is reckoned superior to any in the provinces south of Madras.

Dévipatnam—a sea-port and populous commercial town, well known by the name of the Nine Stones—is celebrated for a bath in the sea, that has been held sacred from the most remote antiquity, and is visited every year by a great number of pilgrims. In ancient days, from this place to Darpasenam, commonly called Tirupallani, was one continued forest, called Puráranyam. Rama resorted here when on his expedition to Lanka, with a design to kill Ravanan, who had seduced away his wife. The priest of Rama told him that, in order to be successful in his undertaking, he must worship some image resembling the nine planets,

* A caste of Hindús whose particular avocation is the cultivation of the palm and the collecting of the toddy it produces. Many of them, however, apply themselves to other occupations, and some are very opulent.—Ed. *Jour. R. A. S.*

including the sun and moon, in representation of which he planted the nine stones on the sea-shore, and, having dedicated them to the nine planets, worshipped them accordingly with much fervency; since which period the Hindús have a tradition, that by bathing here they will be cleansed from their sins, and that, by visiting so miraculous a place, they will, in like manner, be successful in all their enterprises: it is, moreover, observed, that these stones are an emblem of prosperity to the country, and, in the event of any of them breaking off at the top, it is considered a prognostic of some disaster.

A considerable trade is carried on here; there are about fifty trading boats belonging to the port, which, as well as that of Kilakarai, is plentifully stored with provisions, and is, therefore, considered a place of much importance. In times of scarcity the granaries are thrown open, and a free sale is carried on, conducing greatly to the general benefit of the inhabitants, and to the opulence of the merchants who reside here. About the centre of the town stands a Hindú temple, encompassed by a wall and a wide street, through which the wooden chariot of the idol is drawn at the festival, which is held in the month of March. A large pavilion is built on the west of the temple, on the high road, for the convenience of travellers, where, also, alms are bestowed daily on a small number of Brahman passengers, who, however, are not allowed to stop longer than one day. This place being a quay for paddy-boats, and other small craft, a sea custom-house is here established.

Rásingamangalam is a large village situated eighteen miles north of Rámnád, and about one mile east of the large lake of that name, which irrigates an extensive sheet of paddy lands. It is populous, has a few wide streets, and the houses are built moderately well. In the north-east part of the village stands a small Hindú temple, where an annual festival is celebrated in the month of June. To the south-west is a remarkably thick grove of mangoe-trees, affording a pleasant and delightful shade. A small village called Auveranyaindel, lies three miles to the north-east, where a weekly market is held on Thursdays.

Tirupalágudi, lying five miles north of Dévipatnam, is seated below the bank of a lake, and west of the road towards Tanjore. It has a lofty temple almost in the centre of the village, but it is inhabited principally by Musalmáns, who are engaged in the manufacture of long cloths. There is a pavilion on the high road, fronting a reservoir of excellent water, and commanding an agreeable prospect of the sea.

Arnútmangalam is situated two and a half miles to the north of Armukamkotta, on the road towards Trichinopoly; it is inhabited by a peculiar tribe of Velálars* called Arambukutan Velálars; according to tradition, they are a modern people, who, emigrating from the southward,

* A caste of Hindús, whose principal occupation is husbandry.

settled here as farmers about four hundred years ago: their manners and customs, distinguishing them from the other classes of Velálars, are very singular. The men marry among their own tribe, and never seek a bride elsewhere. They will on no account engage to hold a situation under any authority whatever, but employ themselves solely as cultivators of the land: they will not make obeisance to the rájá of the country, nor will they pay any kind of formal respect or compliment to any description of persons, but express their humility by rubbing their bellies with their right hand.

Tondé, a sea-port town situated on the road towards Tanjore, is a dependency of Sivaganga. It carries on a good trade with Columbo, and other sea-ports. A few opulent merchants reside here. The houses are low built; the streets narrow and irregular; the inhabitants are principally Musalmans, but there are also a few Karaiyars; the former are engaged in manufacturing long cloths, and the latter are fishermen. Inland commodities, consisting of grain, tamarinds, cloths, &c. &c. are exported from this place, as also chanks, which are fished in great abundance. It lies eleven miles north-east of Armukamkotta.

Tiruvádanari, a village of some note from having within it a grand Hindù temple, is situated on the high road which leads from Sivaganga to Tondé, and intersects the road that leads from Sivaganga to Trichinopoly; the temple stands near the west end of the village, encompassed by a high wall and a street: the houses are tolerably well built. An annual festival is celebrated here in the month of April; and a weekly market is held on every Monday. It lies seven miles and a half west-north-west of Tondé.

Kunnangudi, a pretty populous village, has a temple on the west, encompassed by a wall, in which is a well of excellent water. It lies five miles and a half on the north-east of Hanumántagudi. This temple is of great antiquity, and is said to have been built by Karikala Chola Raja, while on his religious excursion to Rámèswara. A grand festival is celebrated here annually in the month of June. The productions are chiefly cotton, paddy, and dry grain.

Kottapatnam is a small sea-port town, situated in the Tanjore country, ten miles north of the Pámbanár, which forms part of the general boundary between Tanjore and this country. Several small detached pieces of land appertaining to the latter are irregularly situated in the Tanjore country. A Bráhman village lies east of the road, and within the town are two mosques. Fine cloths, &c. are manufactured here by the Musalmáns, who carry on a pretty good trade. Chanks are fished in abundance, and a good deal of salted fish is carried from this port to distant markets.

Dévakotta is a populous village, but the streets are narrow, crooked,

and dirty. However, it is a place of much importance for trade, and many Hindú merchants reside here.

Sálagrámam is a populous village, situated about a mile east of a large lake on the Sivaganga border, and inhabited by husbandmen, chiefly Velálars. It has two wide streets, and though the houses are neither large nor beautiful, yet, being situated on a high ground, and having an opening at the south and east sides presenting a variety of fields, for the most part of the year in a high state of cultivation, it is very pleasant. A manufacture of brown sugar is carried on here, and a plentiful market is held on every Tuesday. It lies nineteen miles north-north-west of the capital.

Sránám is a small village inhabited by Roman Catholics, seated below the bank of a lake near the borders of Sivaganga. It is noted for a beautiful Roman church, and is the residence of a priest, who has the superintendence of all the Christian villages in this part. It lies five and a half miles north of Sálagrámam.

Kamenkotta is a populous village situated twelve miles north-west of the capital, and south of the high road leading from Madura to Rámnád. Opposite this village is a beautiful pavilion seated on the south bank of a large and fine reservoir, which is filled from the river Vigay. This part of the province is richly cultivated in paddy, and has garden productions in great abundance.

Pagalúr is a small village seated below the bank of a large lake of that name, lying seven miles to the west of the capital. It is celebrated as being the place at which a ceremony is performed on the installation of the zemindár or chieftain of Rámnád. This ceremony is held to be most essential, as the inhabitants of this village are of the original stock from which the guardian of Adam's Bridge was first selected, and therefore they retain the prerogative of bestowing the title of Sétu-patti; the zemindárs, in consequence, observe to the present day to resort hither to receive the sceptre of authority, according to ancient usage; the ceremony continues for a few hours, and consists of a variety of pompous rites.

Gangakondán, a populous town seated on the eastern bank of the Vigay river, lies ten miles north-west of the capital. It is composed of several irregular streets, and has a very good market on every Sunday, is well stored with grain, cotton cloths, and all articles of provision. Extensive groves of Palmyra trees abound on the northern and eastern banks of the river, the toddy from which is taken to Rámnád for sale.

Ninarkovil is a large village near the confines of the Sivaganga country, seated on a pleasant plain well cultivated with dry grain. It lies about fifteen miles north-west of Rámnád, and is distinguished for the grand Hindú temple that stands in the centre of the village. Two annual festivals are celebrated here in April and July. The place is held

in high veneration by the Hindus. There is a large reservoir on the west side of the temple; south of which are several pavilions built for the zemíndár's accommodation, surrounded by a wall. Here is a small manufacture of coarse cloths, which are taken to the neighbouring markets and sold.

Parmagudi, a large and populous town of commerce, is situated on the southern bank of the Vigay river. It lies twenty-one miles north-west of the capital, and through it runs the high road from Rámnád to Madura. It is chiefly inhabited by weavers, and contains upwards of one thousand one hundred houses, for the most part covered with tiles; the streets are numerous, but dirty, and very irregularly formed. Manufactures of the best clòths, silks, muslins, silk carpets of great value, vestures, turbans, women's silk, and coloured cloths, are carried on here, and these articles constitute the best part of its trade. There are several ranges of bazars, and an annual festival is celebrated by a contribution raised by the weavers and merchants. A large and spacious stone pavilion, substantially built, is seated near the west end of the town, adjoining which is a chattiram, where alms are daily distributed among twelve poor Bráhmans, or other travellers. Yams thrive here, and are in great abundance. The ironsmiths here are Musulmáns, who are seldom known to follow this trade in other places.

Paindoni is a small village situated about two miles to the south-east, commanding an extensive view of fields of paddy, cotton, and dry grain.

Abramam, a populous and flourishing town on the high road to Madura, seated below the bank of a very large lake, which is named from it, lies five miles north-east of Kámúri, and thirteen miles south-west of Parmagudi. It is inhabited by merchants and tradesmen, who are principally Musalmáns and Chetties.* The farmers are Marravars† and Velálars, who carry on an extensive cultivation of paddy, which, from the ample supply of water that the lake affords, yields two crops annually. The town is about half a mile in length, divided by two well-formed but narrow streets. On the north side is a well faced with stones, which has a clear spring of excellent water, affording an abundant supply throughout the year, although there are many other wells about it, the waters of which are brackish. The trade is considerable in grain, cotton, and cloths. It is the popular belief, that within an area of two miles in circumference of the town, the bite of a snake, or of any other venomous reptile, has not the usual poisonous

* A cast of Hindús whose principal occupation is merchandise.

† A cast of Hindús who appear to be almost confined to this part of the country. Their occupation is husbandry. In customs they differ from the Velálars, and most other castes of Hindús, and allow their widows to marry a second, third, or fourth time.—Ed.

effect; and that when bitten beyond the prescribed limits, the patient is taken to a small temple that stands on the eastern extreme of the town, where some water is simply administered to him, when, as the people affirm, he perfectly recovers within a few hours.

Víracholen, a village lying about seven miles north-west of Abramam, is seated on the south bank of the Kredamánadi river. It was anciently the residence of the rájás of the country, in whose days it is said to have been very populous, and it still abounds with remains of antiquity which corroborate the assertions of the people of its having been once a place of grandeur and magnificence, and the residence of the Chola Rájá, from whom it derives its appellation. The present population is very inconsiderable, and consists of Musalmáns, Kallaris,* Marravars, and a few other descriptions of people. The manufacture is long cloths: on the north side of the village stands a small Hindú temple of great antiquity. There are the ruins of many other edifices in this vicinity.

Shekull, a populous village situated on the high road towards Tinnevelly. It lies below the bank of a large lake of the same name, and is inhabited by Velálars, Marravars, and herdsmen: the road leads through the village; the houses are poorly built.

Kadaládi, a village situated on the road that leads from Kámúri to the sea-coast. It was a place of great note and commerce; and, though it at present shews marks of decay, it preserves some trade, and has a good market on every Tuesday. It lies ten miles nearly west of Shekull.

Tiruchuli, situated about three quarters of a mile south-west of the capital, and seven miles west by north of Abramam, is a large and populous town on the south bank of the Kundár river. Its inhabitants are numerous. It is composed of a few fine and regular streets, with pretty, well-built houses. The north and east suburbs of this village are diversified with small gardens of esculent and other plants.

Arpukotai, lying seven miles west-south-west of Tiruchuli, is a large village inhabited principally by weavers, who are employed in the manufacture of the company's long cloths. The western environs of this village are plentifully cultivated with tobacco—the soil, a black loam, being very favourable for the growth of this valuable production. A weekly market is held on Fridays, which is the chief one in this district.

Pandlagudi, eight miles to the south of Arpukotai, though not a village of great note, is, however, particularised as being the only place where the manufacture of saltpetre is carried on in this district; and

* A low cast of Hindús peculiar to this part of India. They are herdsmen and cultivators, and, as their name implies, thieves by profession.—Ed. *Jour. R. A. S.*

also for a layer of white stone, of a brittle nature, which extends from the south of it in a north-westerly direction, as far as Palavanattam. The stones are collected, and burned in kilns for the preparation of chunam or lime, which is esteemed the finest sort that can be had in the province. The ruins of a double-walled mud-fort stand on the west of the village.

RIVERS.

There are many streams in this province that empty themselves into the sea, but none are navigable, and few deserve the name of rivers. They are for the greatest part nothing more than broad brooks or rivulets; some are only drains flowing from the lakes, others spring from the high lands, and both are every where fordable. Running upon a flat and almost level surface, they become broad without having a bed of any depth. These rivulets, in their course, supply several lakes, and the water is reserved for the purpose of cultivation, which, in good years, yields a valuable produce.

Pámban-ár, a rivulet which rises from the high lands east of Kunagudi, in the Sivaganga, enters this province on the west, near the upper frontier, below the village of Perambúr, takes its course easterly about five furlongs, crosses the general boundary, and re-enters Sivaganga; where, for more than three miles, it continues its course, when, touching the boundary south-east of Tirtengúr, and winding along it for about three-fourths of a mile, it re-enters this province. About one mile in its tract it is intersected by a channel which supplies the Mutunád lake. Pursuing its course for a few furlongs in an easterly direction, it separates into two branches, which, after running nearly parallel with each other to the distance of three miles, unite near the junction of another channel, termed the Pámb-ár. Widening gradually in its course, the stream receives another branch below Elapagudi, which flows from the southern kalingula of the Mutunád lake, and proceeds south-east about three miles; touches at the boundary between the villages Payaddakotta and Mudukuvial; constitutes a small part of the northern boundary between this province and Tanjore, and continues its course for three miles, where it intersects a detached piece of land appertaining to Sivaganga; whence, meandering along the general boundary in an east-north-east direction, it separates into five branches, and disembogues into the sea by three mouths.

Vírashelai-ár, a narrow and rapid stream, has its source in the high lands in the vicinity of Prámalli, in the Sivaganga country; and, being fed by numerous jungle streams, passes by Naikupai, supplies the large lake at Tripatú, and, after an easterly course, crosses the high road that leads from Pudukotta to Sivaganga; thence, continuing easterly about a mile, it glides south, and crosses the road from Kunagudi to Tripatú,

where it unites with a channel that flows from the northern kalingula of the Tripatú lake, continues its course to Murthen-puliar-kovil, through an entire wood, and traversing in an east-south-east direction four miles, receives a channel from the west, termed the Tirumunimutu-ár, about one mile south of Nedavakotta, whence it pursues an easterly course through a thick grove of Palmyra trees, widens in its way, and passes by Kullel Yalavenkotta, where it enters this province below the termination of a disputed boundary, and is joined by a channel called Koatha-ár, west of the village Othayauchi. It then takes a north-easterly course towards Thavakotta, where it separates into two branches, which, uniting about a mile to the east, run north of the fort of Hanumántagudi, and south of the village: it again separates into two branches. The northern one runs easterly three miles, and then separates into two streams, taking an east by south course for ten miles, and falls into the Pàmban-ár, below the village Audavatúr; the lower branch assumes the name Paushi-ár, from the village Paushipatnam, which is situated on the coast near the junction of this channel with the sea. The southern branch of the Virashelai-ár pursues a south-easterly course about seventeen miles from Hanumántagudi; passing by Kumbukotta and Audavatúr, it waters several tanks in its tract; and, crossing a high road that leads to Rámnád, along the sea-coast, discharges itself into the sea.

Munnímutu-ár, a rivulet issuing from the southern kalingula of Kotaivial lake, in the Sivaganga country, takes a south-easterly course, and, passing by Kaurai, Pauvanakotta, and Munní, enters this province on the east by the latter village, and afterwards pursues a south-easterly course eight miles; waters the several lakes in its tract; and falls into the Teruvádanári lake, from whence the surplus water, flowing over the southern kalingula of that lake, in like manner loses itself in other lakes towards the east, the superfluous waters of which still form a pretty wide stream near Thullamurrungur, and running in an open plain, crossing the high road to Rámnád, forms a communication with the sea to the south of Tondé.

Kotaikarrai-ár, a wide and rapid stream formed at the junction of two rivulets that enter this province on the west by the village Kokaárné, waters the large Rásingamangalam lake, the superfluous waters of which are conveyed by a channel that issues from a large and well-built kalingula constructed on the northern bank. This channel runs in an east-south-easterly course five miles, crosses a high road by Armukamkotta, and glides south-east nearly two miles; thence it pursues an east-south-east course towards Kunnaryaindel, runs south-east from that village about a mile, separates into two branches on the west of the high road, and communicates with the sea by two mouths about a mile distant from each other.

Vigay, a river which rises among the mountains on the south-east of the Dindigal valley. This river runs through the north-east ridge of a chain of mountains that border on the west of the province of Madura. It finally escapes from the mountainous tract which it traverses for about thirty miles, precipitates itself at the foot of the hill of Guntapanaikandr, passes by Pilmankúnbi, Nuddavakotta, and Cholavándán, and, being augmented by the waters of other small rivulets, it passes by Thovaramán and Madura; and thence rolling in a considerable body, and traversing these districts in a course nearly south-east, reaches Tripavanam, where it becomes very broad, continues in a winding course, and, being fed by other streams, passes by Mánamadura; then turning south a few miles it proceeds east, and enters this province on the west by the village of Tholachatanúr. Here for about eight miles it forms a part of the general boundary between this province and Sivaganga, in a course nearly due east. This fine river comes with a full swelling stream between Pirmaguda and Yaveneswara, towards Warapuli (where the boundary embraces a small village that stands on the south bank appertaining to Sivaganga); and gliding on south-east three miles, turns east for four miles, when the stream, flowing directly south for three and a half miles, is considerably diminished in its width, and now makes but a poor appearance in consequence of the numerous cuts from it for the purpose of irrigation, and to supply the lakes. The Vigay, now confined in a narrow bed, continues eastward in a winding course for eight miles, and then spreads into a large lake called Periyakolam. A small channel on the north continues easterly; it was recently cut to prevent the injurous consequences of inundations, which are represented to have frequently happened previous to this undertaking. The Vigay, retaining its name, proceeds eastward for six miles, losing itself in a salt-marsh which extends nearly five miles in length, and about a mile and a half in breadth, where, from the saline nature of the soil, a considerable quantity of salt is extracted. At the east end of the marsh the river again reappears, and proceeds in a south easterly direction about five miles; thence it forms a serpentine course, and communicates with the sea below the village Autankarai. The whole of its winding course is about one hundred and forty miles. The Vigay is the largest of all the rivers in the province, and is represented as possessing the rare advantage of affording water the whole of the year. It generally overflows from about October to December, after which it begins to decrease: the fertility of the provinces of Madura, Sivaganga, and Rámnád, depends upon the overflowing of the Vigay, from which numerous canals and water courses are led off to supply the several lakes, and for the purposes of irrigation. It is very precarious when the freshes descend in the month of April; the supply is then most

carefully reserved for the purposes of cultivation. The lands upon the whole course of the Vigay yield an abundant and valuable produce.

Kredamanadi, a rivulet which has its source from the Vigay, near Madura, enters the Sivaganga country by Pilliyúr, in the Trippavanam district, winds in a south-easterly direction for about twenty-five miles, watering a great part of that country to the south-west, touches the boundary of Rámnád below the village Víragudi, and continues in a south-easterly course for three miles, passing by Víracholan ; it further embraces a portion of the country to the north about a mile and a quarter, and thence forms another part of the boundary for about a mile, whence it glides on in a southerly direction, watering the country in its course for about eleven miles, and receives a small rivulet termed the Purralla-ár, near its confluenee with the Ragunát'ha-kaveri.

The Trimangalum river, termed the Kund-ár. is a narrow and rapid stream which, rising among the hills of Annayúr, in the Madura district, enters this province on the north in the Pullimat'ham district, by the village Kurriapatti. It takes a winding course to the east about a mile, and thence turns almost south five miles, and passes by Toapúr and Parenjalli, where it receives the Sheverikotta river, which descends from the mountains in the Tinnevelly country ; it widens greatly at the confluence, pursues a south-easterly course, runs between Tiruchuli and Pullimat'ham, washing the western wall of the fort, and continues to proceed to Elipúr, on the north of which it is intersected by a brook from the high lands to the east of Puliarnátham : from Elipúr, it winds eastwardly for six miles, and passes by Mandelmánikam, and, gliding on south-easterly two miles and a half, turns due south down to Kámúri, west of a high rocky ground, and runs between the fort and town. To the east of the latter, on the southern bank of the river, is a large kalingula, about one hundred and seventy feet in length, and about seventy feet in breadth ; the time of its original construction appears to be unknown ; but that it is of a very ancient date is sufficiently indicated by the style and state of the structure, which not only bears every mark of antiquity, but also of frequent dilapidation and repair. It is wholly composed of large weighty masses of rude stones laid upon one another withont any regular system, every dependence having been placed upon the magnitude of the materials ; hence the power of the great body of water, in its pitch over the work, has frequently occasioned breaches and also placed the structure in so critical a predicament, that the inhabitants of the country to the eastward, especially in the Shekull and Mutukullutur districts, sustain the loss of an extensive cultivation, estimated to be about sixty thousand pagodas annually. No anxiety appears to be entertained by the possessors of this province to adopt any measure for restoring so important a work to its primitive state. A large canal, led off from immediately above the work, termed the

Ragunát'ha-kaveri, flows upwards of twenty-four miles through the country to the eastward, being preserved in its course over a fine plane, and affords the means of cultivating the lands upon the whole of its tract, sluices having been constructed for this purpose, most of which, unfortunately, are now in ruins. This channel wastes itself ultimately in the Kullari lake, and the superabundant flow of salt-water issuing from the southern kalingula of this lake, falls into the salt-marsh below the village Vigay, and, cutting through it, assumes the name of Kottegudi-ár, which communicates with the sea, on the west of the spot called Adisétu-tírtha. The Kund-ár, or the surplus water that descends from the kalingula on the east of the town of Kámúri, winds in a south-easterly course for twenty-two miles, runs towards Mukúr, supplying in its tract a few lakes, and disembogues into the sea. It has a wide but shallow entrance, and a heavy shoal renders the free access of boats at the mouth impracticable.

LAKES OR RESERVOIRS.

These are variously named; the larger are called Yéris and Kummis, the lesser ones Yendels. The country abounds with them; several of the large ones are supplied by canals from the rivers, while others of less magnitude are filled by the local rains; the latter do not retain the water for more than three or four months. Although the larger lakes have a source whence they receive a constant and ample supply, yet the advantage of retaining their waters throughout the year is lost, from neglect of the regular system of inspection and repair. The periodical rains usually set in about the months of October and November, and the country then exhibits an almost entire watery surface; the great body of water confined by the embankments of the lakes spreads out to a great extent, often overflowing and destroying the embankments, greatly to the prejudice of the after cultivation of the lands, which depends upon the strength and preservation of these banks. When a general drought prevails, the inhabitants dig small pits in the beds of the reservoirs, whence they obtain a scanty and muddy draught. At this season the people are generally assailed by a disease called Guinea-worm; but they are so much inured to this tumour in their legs, that they think little of it. Of the principal Yéris, the following seem more particularly to deserve description, viz.:

Rásingamangalam, a large lake situated between the smaller lakes Kokaurne and Koshavan; its length from the north bank to the southern opposite extremity being nine miles, varying in breadth from one to two miles. It receives on the north side the stream of a rivulet that flows from the high lands in Sivaganga, denominated the Kottakarai-ár, and, on the south-south-west, the waters of the Vigay river. This lake originally watered about five thousand seven hundred and

sixty kánis of land.* It has two large kalingulas at either extremity; the northern consisting of seventeen arches, and the southern of fifteen; and, besides these, eighteen lesser sluices, built of stone and brick, most of which, as well as the larger kalingulas, are in a dilapidated state, in consequence of which it cannot at present supply water for more than two thousand five hundred kánis. There are six breaches along the bank of this lake, occasioned by the breaking through of the waters during the monsoons, and these not being attended to, it presents much danger to the villages and lands lying below it to the eastward.

Perriakolam; this lake, with which the Vigay river forms a communication, is situated about a mile north-west of Rámnád, and extends in length about seven miles; its breadth varies from three-fourths of a mile to nearly two miles, and, from its greater depth, it has the advantage of reserving its waters for a longer period than the Rásingamangalam. It irrigates an extent of land consisting of one thousand eight hundred and sixty kánis. This Yéri has two large kalingulas; one to the north, consisting of nine arches, the water from which flows to the eastward on a low level, and falls into an extensive salt-marsh. The kalingula to the south consists of seven arches, and the stream from it falls into the Chukrakotta lake, which lies to the south. There are twelve smaller sluices to this lake, three of which are in ruins.

Chukrakotta lake, situated on the south of Rámnád, has a large and substantial kalingula consisting of eleven arches; the surplus water discharged from it forms a canal which flows into a marsh about a mile to the southward. A kalingula on the north consists of five arches only. This lake has twelve other sluices, denominated after the original possessors of the land depending thereon; five of these sluices have been in a state of decay for the last fifty years, and the inhabitants in consequence sustain a very great loss, as they cannot irrigate more than a fourth of the land that was formerly under cultivation.

Kullari lake receives the Ragunát'ha-káveri; it is situated between the villages Tirukoshamangai and Kurkáti, and irrigates about one thousand five hundred kánis of land. This lake has two kalingulas, and twelve smaller sluices, all of which are in good order: the great quantity of water that flows from these kalingulas spreads over a salt-marsh to the eastward, and from thence, forming a channel, ultimately falls into the sea.

Abramam lake, situated to the north of the village of that name, resembles in form a spur; it is supplied by a channel from the Kreda-

* About an acre.

manadi, and waters about one thousand kánis of land: the bank is very high and substantially built. It consists of very large stones placed upon one another, and seems once to have been much more regular than at present; it has puzzled antiquarians to account for the laying of these enormous stones, as their weight is so great that no means are now known by which they could have been placed there. An odd tradition prevails that this was performed by demons. The bank is so well strengthened that it has never had any breaches, nor is it likely ever to require any great repair.

Several large lakes sustain considerable loss owing to the weak and unsubstantial condition of their banks. The waters from the high lands, and the surplus from the lake of Shekull, form a pretty wide stream, which discharges itself into the sea at Válimukam Bay, which has a good harbour for sheltering the vessels trading along this coast during the period of the land-winds and monsoon. Contiguous to this bay, on the north, is a large lake of salt-water that extends about seven miles to the west, its greatest breadth being a mile and a quarter. Salt is gathered in large quantities here, besides that which is manufactured in the salt-pans; this article is a produce very advantageous to government. Wells and fountains are, for the most part, exceedingly rare in the interior of this country, and the water that issues from them is of a very brackish quality. The sea-coast towns, although situated on vast plains of deep and heavy sand, afford fine wells and springs of clear water. A narrow salt-water lake, called Turrava, extends from the Kottaigudi river, below Tirupallani, to the east eighteen miles, and varies from one quarter to half a mile in breadth, bordering the declivity of a range of sand-hills. This lake has a verdure on its margin, which affords good pasturage for the cattle of its vicinity. On the south side are several thick groves of Palmyra and cocoa-nut trees. At some seasons of the year a dam is thrown across this lake, confining the water to a particular part, and, by letting it off as required, admits of the remaining portion of the bed being cultivated with rice. Another salt-water lake, but of smaller extent, lies to the east of the former, and has a communication with a basin of salt-water contiguous to the sea, east of Pullimat'ham.

HILLS AND MOUNTAINS.

There is not a mountain, hill, or any conspicuous eminence in the whole of this province; yet it exhibits, in several parts of its surface, gentle swells and depressions which give it a pleasing diversity, especially in the tract about Kámúri. In the Pullimat'ham district there are a few low scattered rocks, but of very inconsiderable magnitude. The sea-coast on the south, from Tonitorai westward, abounds with low,

rugged rocks, extending into the sea; and these, with a great number of shoals and hidden rocks, render it dangerous for coasting vessels.

WOODS AND JUNGLE.

This country is, for the most part, divested of wood and jungle. Such as does exist is principally composed of the Odunkád, a kind of low thorn-tree, of which there are various sorts; but none of them are of a size to yield good timber. Near the sea-coast towns are extensive groves of Palmyra and cocoa-nut trees. The northern districts abound with the former, the soil being admirably adapted for their growth. Mangoe, Illapay, and other fruit-trees, are scarce throughout the province, and cocoa-nut trees are rare in the interior of it.

TIRTHAS.

These are certain consecrated spots in the sea, considered as sacred places for bathing, to which the Hindús frequently resort on pilgrimage from all quarters of India, to perform their ablutions, especially at the nine stones at Válimukam and Adi Sétu-tírtha, which are renowned places of sanctity on this coast. The act of washing in these places is esteemed equally as efficacious for purifying, and absolving from sin, as the far-famed Ganges.

ROADS AND PASSES.

There are several principal roads that lead through this country from the neighbouring districts. The first is a high road that leads from Tanjore by Kottapatnam, proceeds along the sea-coast, and is much frequented by pilgrims who travel to and from the Ganges to Rámésware. About two miles from Kottapatnam the road leads into the Tanjore country, crosses a rivulet, and proceeds to Sundrapándipatnam. In its progress further, about five miles, it crosses the Pámban-ár (which here forms the general boundary between Tanjore and Sivaganga); and about a mile south, leads near a fine chattiram in the Sivaganga limits; west of Sundrapándipatnam, about two miles, it crosses the Páshi river; and, at a mile further, the Verashelai, and thence passes by Tondé, where several cross roads intersect. Leaving Tondé, it crosses the Munnimutu-river, and a few other small rivulets, and, at the distance of about eight miles, is intersected by the Kollaikarai-ár, and, passing by Tirupálagudi in its progress, it touches at Dévipatnam, after which, crossing a few brooks, it separates into two roads; the one leading along the coast toRáméswara, the other, crossing the Vigay river, enters Rámnád, making through the whole of its course a distance of nearly fifty miles. This, although a carriage-road, is very inconvenient, owing to the heavy sand along the sea-coast. The second is a high road that leads from Trichinopoly to Rámnád, *viâ*

Pudukotta, enters this country on the north by Sheraganúr, passes by Kunnangudi, Mangalagudi, and Tiruvadanari, where it is intersected by several cross roads leading to the coast; thence it touches at the village Arnutmangalam, crosses the Kottaikarai-ár, and leads off on the west by Armukam-kotta to Rásingamangalam, proceeds to Sholandúr, and passing below the banks of two large lakes, touches at Peruvial, near which it is intersected by several water-courses, and latterly passes by Pillengudi on the north bank of the Vigay river to Rámnád. This is one of the grand carriage-roads, but is in a bad state owing to the frequent intervention of paddy-fields, which render it altogether impassable in the rainy seasons. A third road, also leading from Trichinopoly, separates into two parts at Tripatúr; the one leads *viâ* Sivaganga, and the other by Kaulear-kovil, and these joining at Yellangudi, the road enters this district about one mile and a half west of Ninar-kovil, and, in its progress, crosses the Vigay, passes near a fine pavilion, called Chetti-Mattam, where it joins the high road leading from Madura to the capital, and proceeds along the south bank of the Vigay below Gangakondán, and, re-crossing the river again at three other places, two miles distant from each other, passes by Mothalúr to Rámnád. The state of the road is tolerably good, but much inconvenience is felt by the intersection of the Vigay river at several places. The fourth is a high road that leads from Madura *viâ* Mánamadura, enters this province immediately after crossing the Vigay river by Tholashatanúr, and proceeds along the south bank for three miles, touching at Parmagudi, a fine, large, and populous town, where there are two or three substantially built pavilions for the accommodation of travellers. The road runs through the town along the southern bank, about ten miles to Chetti-Mattam, and passes by Wurapilli, in the interval of which it crosses many canals branching from the Vigay, which render the road unfit for carriages; it then leads eastward to Rámnád. The fifth is also a high road that leads from Madura to Rámnád *viâ* Avúr. It enters this country at a village called Utchampalli, and, in its progress, crosses the Sheverikotta river, near its junction with the Kundár, touches at Tiruchuli, crosses the latter river, and proceeds to Shadapúram, where it separates into two different routes, the one leading to Kámúri, and the other to Abramam: the one that leads to the latter place passes by Anakolam, Mandelmánikam, and Nártakurchi, next touches at Abramam, and, in its progress to Rámnád, passes by the intermediate villages Perrúnkurnai, Alenganar, Chetra, Wulayar, Yettivial, and Lánthamattam. This road is extremely good, owing to the high and level surface of the country. The sixth, a high road that leads from Madura, Tiruchuli, and Kámúri, to Rámnád, touches at Kámúri, and after crossing the Kundár river on the east of the town, it intersects the high road from Abramam at the distance of five miles.

This is also a good carriage-road from the evenness of the country. The seventh, a high road leading from Tinnevelly to Rámnád, enters this province on the west of Kunirajapúram, touches at Narripúr, and, in its way, passes by Sholagudi, when it crosses the Kundár, and proceeds about five miles between a range of sand-hills, touches at Kilashelvanellúr, from which place a road separates to Kilakarai by the villages Kilakedáram and Sivakolam, where it crosses a rivulet and passes by Yérvádei to Kilakarai, and from thence proceeds along the sea-coast *viâ* Mutupetta and Vaidálai, to Pámban and Ráméswara. The road that continues from Shelvanellur to Rámnád, touches at Kothenkolam, a small village (about two and a half miles distant), and thence at Shekull, three miles from the latter, and passes through Tirukoshamangai, which is seven miles short of Rámnád. The eighth is a sea-coast road leading from Dévipatnam towards Autankarai and Pullimat'ham, where it crosses the ferry to Pámban, and proceeds to Ráméswara, being in this part paved with stones. All along this road are spacious and durable pavilions and chattirams for the accommodation of travellers and pilgrims. Several cross-roads intersect each other in all directions throughout the country, which, though not answering for carriage-roads, are much frequented by a class of people who chiefly trade in salt.

SOIL AND PRODUCTIONS.

The soil in this province is composed of various sorts, and, though generally fruitful, is not without some predominant disadvantages, a proof of which has been experienced by the continual emigration of the inhabitants from this to the neighbouring countries, especially within the last four years, during which period a great scarcity and mortality has prevailed, arising from a failure of rain; and the number of inhabitants who have abandoned this province from indigence, and its concomitant evils, is estimated to be not less than 150,000 souls, or nearly half its population.

The soil, though not of a very rich kind, yet, aided by enlightened husbandry, may vie in fertility with the best in the neighbouring countries, and produces early and excellent crops of paddy and of dry grain. The most fruitful soil consists of a deep black loam, which is prevalent towards the westward; the culture on these lands yields an abundant crop of cotton and dry grain. Coriander and Kadalai* are well cultivated in parts of Abramam and Kámúri. The soil next in quality is a red loam; and, inferior to these, is the black and red, light and sandy soils. Vegetation thrives remarkably upon the latter,

* A kind of pease, much used in Bengal and Upper Hindústán, and in the south commonly called Bengal gram.

which is common about the sea-coast towns, contiguous to which the grounds are inclosed and divided into small gardens. The productions consist of paddy of various kinds, several sorts of dry grain, horse gram, and a variety of other pulse, rape-seed, and oil nuts; cotton in great plenty; and the choya-vér grows spontaneously about the sea-coast and the islands. Besides the latter, there is in the western districts a small production of a thistle-plant, from the flower of which a reddish colour is extracted, and the cloths that are dyed with this are held in high estimation by the natives. The garden productions consist of raggy, beetle, pumpkins, saffron, limes, tobacco, yams, potatoes, cucumbers, sugar-canes, and plantains; the two latter, however, are not only rare, but of a meagre sort. The northern districts, as well as the neighbourhood of several of the sea-port towns, are very productive of the Palmyra, from the toddy of which a considerable quantity of coarse sugar is manufactured.

MANUFACTURES, IMPORTS, AND EXPORTS.

As a commercial province, and for manufactures, Rámnád is distinguished beyond many others, and principally for the manufacture of cotton cloths; the first of which is at Parmagudi, where the chief occupation of the inhabitants is making printed cloths, chintzes, silks, elegant silk carpets, red and blue striped cotton carpets, muslins, dúpettas, turbans, dimities, izaries, ginghams, cambrics, &c. Kílakarai and Dévipatnam are fine ports, the trade of which is very considerable; they are consequently the resort of many respectable merchants from all parts, whereby these places have become rich and populous. Kílakarai is reckoned next to Parmagudi for the manufacture of fine cloths, muslins, &c. A few other places are noted for long cloths of good quality, viz. Kámuri, Abramam, Arpukotta, Pálayampatti, Kuddeladi, Yekugudi, Punnakolam, Chittarkotta, Numbuthullai, Tindey, and Kottapatnam; and those of a coarse quality, commonly worn by the inhabitants, are made almost in every village in the province. Salt is manufactured in great plenty in the neighbourhood of the sea-coast towns and villages, but it is entirely under the management of the servants of the government. Besides the manufacture of this article, a prodigious quantity of it is gathered from the extensive salt-marshes, in which, on the evaporation of the water, a thick incrustation of salt, very white and fine, is left on the surface. Except at Pundlegudi, saltpetre is no where manufactured in this province.

The chank fishery commences in April on the eastern coast of Rámnád, and continues till the month of September; and, on the southern coast, from October, continuing till march. It is usually rented by the zemíndár at not less than six thousand pagodas annually. The chanks fished on the eastern coast are reckoned better

than those of the southern. A comparative rate has long been established at one hundred and thirty-five chanks per star-pagoda, while those of the southern-coast are sold at one hundred and sixty-two per pagoda. The number of chanks annually fished amounts to upwards of a million. The country arrack is distilled in several places throughout this province.

The imports are shawls, woollen cloths, wheat, sugar, sugar candy, pepper, nuts, nutmegs, cinnamons, cloves, cardamums, mace, brimstone, quicksilver, iron, pearls, corals, and a variety of precious stones; teak-wood, black, and Ceylon wood; red and yellow ochre; and, in the time of scarcity, grain is imported hither from the western, as well as from the Tanjore countries. The chief trade of this province consists in the exportation of manufactured cloths of various kinds. The chanks are taken to Bengal, and the choya-vér to the northern countries; and, during a plentiful season, paddy, and other grain, are also exported. Salt is the principal commodity of export to the inland countries.—*Journal of the Royal Asiatic Society of London*, No. 5. page 165—188.

Second Report of the Meteorological Committee of the South African Literary and Scientific Institution.

The Meteorological Committee having proceeded to draw up and circulate a compendious body of instructions for making and registering Meteorological Observations*—the same which forms a part of their first Report to this Institution—and having, moreover, distributed in various quarters copies of the printed forms alluded to in p. 16 of that Report—have received in consequence communications from various parts of this colony, in most instances expressing great willingness to co-operate in the observations recommended, but in almost every case complaining of the want of meteorological instruments, and in some, requesting a supply. Your committee are not without hopes of being enabled in some instances to supply the deficiency. Meanwhile they have to acknowledge the receipt of a regular return, according to their printed form, from Captain Wolfe, Commandant of Robben Island, of

* Vide No. 14 of this Journal, page 196.—The tables of Meteorological Observations sent from Madras will, we hope, have reached the Institution, and we request the conductors to favor us with copies of their interesting Reports, by the earliest opportunities on all occasions. The present Number of this Journal contains tables of horary observations made at three widely separated stations of the peninsula of India, and we invite Meteorologists in other quarters to follow the suggestions of Sir John Herschel.—*Editor Madras Journal.*

the state of the barometer, interior and exterior thermometer, wind, and weather, at the hours agreed upon, during the whole of January, February, March, and April, of the present year, with the promise of their future regular continuance. In this communication the observations appear to have been made with such regularity, and the instructions of the Committee generally so well attended to, as leads them to regret that the barometer employed should (as appears by the numbers set down) be one capable of being read only to the nearest tenth of an inch, and to render them very desirous to supply a better. A spare barometer belonging to the Royal Observatory has been accordingly placed at their disposal by the Astronomer Royal, and so soon as it shall be furnished with a new tube, and otherwise repaired, will be forwarded to Captain Wolfe, with a request that his series of observations may be continued with this instrument, instead of that at present used;—Robben Island being in many respects a highly advantageous station for acquiring an insight into the meteorology of this point of the coast, much more so than Cape Town itself.

From Worcester, your Committee have received a register of the thermometer only (having no barometer), from P. J. Truter, Esq. Civil Commissioner for the district, for the month of January of the present year. Having only one thermometer, which is used both for ascertaining the interior temperature and that of the outer air, the Committee would recommend that he should be supplied with at least one other, and be requested, until a barometer can be procured, to fill up the column of the in-door thermometer with observations of the hygrometric state of the air, as ascertained by the depression of temperature produced by wrapping the bulb in wet linen or cotton, and suspending it freely, in the manner recommended in p. 12 of their Instructions.

The Committee have also received from the Astronomer Royal, and from Sir J. Herschel, hourly Observations at the Solstices of December 1834 and June 1835, and the Equinox of March 1835, made according to the plan proposed in their printed Instructions. The comparison of these observations has shewn, that, in this locality at least, even at stations so near together as Feldhausen and the Royal Observatory, the fluctuations of atmospheric pressure are very far from nicely corresponding, and that, so long as any wind subsists in a mountainous district, the atmospheric strata can by no means be regarded as horizontal. The calm, however, having been complete and uninterrupted for ten successive hours on the night of the 22d ult., afforded an excellent opportunity for determining the difference of level of the two stations, which appears to be 129 feet 8 inches, subject to a trifling correction for the zero points of the barometer, which remains to be more exactly ascertained.

Communications have been received by the Committee from Sir E. Ryan, Chief-Justice of Calcutta, containing a Register of the barometer and thermometer, kept by himself during his passage from Table Bay to Calcutta, in the months of December, January, and February 1834-5 ; from ——— McHardy, Esq. Surgeon on board the Mountstuart Elphinstone, containing a similar register made in the voyage of that ship from Table Bay to London, during parts of the months of September and October 1834: from Captain Wauchope of H. M. S. Thalia, containing extracts from a Journal of the barometer and htermometer, &c. observed on board of H. M. S. Eurydice, off Saldanha Bay, during a heavy gale in 1819, as also in Table Bay during a violent north-wester in 1817 ; and, lastly, from H. W. Innis, Esq. Surgeon on board the Sherburne, containing a similar register kept during the approach to and after the arrival of that ship in Table Bay in January 1835.

Of the two former of these communications (those of Sir E. Ryan and of Mr. McHardy), it must be observed, that they both, but especially the first, afford strong corroborative, and indeed quite decisive, evidence of that important meteorological fact, of a considerable depression of the barometer in approaching to the equator from extra-tropical latitudes. Sir E. Ryan's barometer, previous to his sailing, was compared, through the medium of a portable barometer in possession of Sir J. Herschel, with the Mural Circle barometer of the Cape Observatory, the difference of which, from the standard of the Royal Society, had been previously ascertained by two distinct comparisons, agreeing perfectly *inter se*, made by the intervention of the above mentioned portable barometer which had been brought to the Cape by Mr. Henderson and again transported by him to London. By these comparisons, it was found that Sir E. Ryan's barometer required a correction of—0.116 in. to reduce it to the Royal Society's standard. This correction being applied, and the reading so corrected being reduced to the freezing temperature, and classed into groups in zones of 10° in breadth, proceeding northwards and southwards from the equatorial zone (between the latitudes 5° N. and 5° S.) according to the observed latitudes of the ship at noon of each day, give as follows :—

Limits of the Zone of Latitude.	Number of Days' Observations.	Mean Pressure observed in Inches.	Mean corresponding observed Latitude.
Equatorial Zone.			
Lat. 5° N. to 5° S.	7	29.821	0° 41'
— 5 — to 15 —	10	29.849	9 50
— 15 — to 25 —	8	30.040	19 12
— 25 — to 35 —	10	30.125	31 0
— 35 — to 40 —	24	29.934	38 25

The observations of Mr. McHardy, though extending only to latitudes south of the equator, and, though evidently made with far less care, and with an instrument in which the fluctuations arising from the motion of the ship are very imperfectly destroyed, yet, when reduced and grouped in a similar manner, afford a result agreeing in their general tenor very satisfactorily with those of Sir E. Ryan. To render them comparable, as the zero of Mr. McHardy's barometer is unknown, a correction of— 0.188 has been applied to all his reduced observations, by which the equatorial indications of the two barometers are made to agree, and the following table exhibits their results when so reduced, grouped, and corrected :—

Limits of the Zone of Latitude.	Number of Days' Observations.	Mean Pressure in Inches.	Mean corresponding Latitude.
Lat. 0° N. to 5° S.	8	29.821	1° 42′
— 5 — to 15 —	5	29.802	9 20
— 15 — to 25 —	6	29.960	19 41
— 25 — to 35 —	16	30.065	31 20

The total depression concluded from the latter series of observations agrees very nearly in amount with that stated by Sir J. Herschel, as the result of his own observations during his voyage from England. The general fact may now therefore be looked upon as unequivocally established, and it is hoped that it will henceforth attract the attention of all voyagers ; and that observations will be diligently accumulated for the purpose of ascertaining the law of variation of atmospheric pressure in all latitudes both within and beyond the tropics, and in either hemisphere, since it is very possible that the same exact law may not be found to apply to both, and that the Atlantic, Indian, and Pacific Oceans may offer differences depending on their different extent and relation to the continents adjacent to them.

If, in a report like this, it be allowed to speculate on the causes of meteorological phenomena, it appears extremely probable that the equatorial depression in question arises from the same cause which produces the trade winds, viz. the rarefaction and consequent ascent of the equatorial air, which, although constantly supplied from the extra-tropical latitudes, is yet not supplied *instanter*, nor without a due dynamical motive force, which, in a free elastic fluid, *can* be no other than an excess of pressure on the side from which the supply is drawn, or (which comes to the same thing) a diminution of it, in the nature of a " suction," on that side towards which the superficial currents rush; which excess and diminution obviously arise from the overflow of the unsustained portion of atmosphere above the equatorial zone into the regions beyond. The inquiry, therefore, connecting itself as it does,

with all the greater phenomena of meteorology, assumes a high degree of interest, and will no doubt be studied with the perseverance and exactness it merits.

A series of observations of the heights and times of high and low water at Simon's Bay, extending from January 26, to June 30, has been obligingly submitted to the consideration of the Meteorological Committee, by J. Deas Thomson, Esq. and the Astronomer-Royal. It has not yet been possible to compare them with any theory, and indeed it would be premature to attempt it here, as they will require to be combined with the mass of knowledge now accumulating on this subject in Europe, to render them in any degree available. One remarkable result, however, may be mentioned here, which offers itself on a very cursory inspection of the heights, as compared with the declinations of the Sun and Moon, viz. that while the monthly fluctuation of the mean sea-level, arising from the *moon's* alternate occupation of the northern and southern hemisphere, is scarcely perceptible, amounting hardly to two inches, its annual variation, due to the similar approach of the sun to the northern and southern solstice, is much more considerable, and forms indeed a prominent feature in the Tides of this coast, amounting to no less than eight inches, or nearly a fifth of the average difference between high and low water—as the following brief Table will shew—in which the interval embraced by the observations is divided, not as usual into lunations from full to full or from new to new Moon, but into periods marked by the moon's passing from south to north of the equinoctial. By this division the effect (if any) of the moon's change of declination compensates itself, and leaves the solar effect in evidence. The cause of the prominence thus given to this part of the sun's agency, appears to lie in the length of its period compared with the moon's, which gives time for the waters of the whole ocean to accommodate their general level to the actual force, by bodily transfer from one part of the globe to another, and by assuming, at each instant (what the tides of short period have never time to do), very nearly the figure of equilibrium due to this particular modification of the disturbing forces.

Observed Mean Positions of the Mid-water mark on the Float of the Tide-gauge at Simon's Bay, during successive intervals of the Moon's Transit from North to South of the Equinoctial.

Limits of intervals	No. of Tides observed.	Heights of Mid-water on the Gauge.	Remarks.
Jan. 26 to Feb. 16	22	4 feet 4.38 in.	period incomplete.
Feb. 17 to Mar. 15	27	4 .. 2.35 ..	
Mar. 16 to April 11	27	3 .. 10.83 ..	
April 12 to May 9	28	4 .. 0.22 ..	
May 10 to June 5	27	3 .. 9.52 ..	
June 6 to June 30	25	3 .. 8.37 ..	period incomplete.

At the meetings of the Institution of Wednesday September 3, and October 1, Sir J. Herschel stated that he had examined the Meteorological Journal kept at the Port-Office by Mr. M'Cleod, under the direction and superintendence of Captain Bance, during 58 months, commencing with October 15, 1828, in which are registered the heights of the barometer with the temperature of the instrument, for the hour of 9 A. M., noon, and 3 P. M., with the usual notices of wind and weather, and that having reduced and interpolated them by graphical projection he had been led to the following conclusions:—

1st, That the atmospheric pressure at Cape Town is subject to a considerable and very regular annual fluctuation, amounting (when reduced to a temperature of 32° Fahrenheit) to 0.287 in. —the highest level being attained about the 16th of July, and the lowest about the 16th of January, on an average of five years.

2d, That the barometric pressure is also subject to a regular diurnal fluctuation, whose average amount, on a mean of the whole year, may be stated at 0.027 in.; the highest pressure taking place at or about 9 A. M., and the lowest (so far as can be gathered from observations made only at the hours above named) at 3 P. M.

3d, That this daily oscillation is itself subject to an annual alternate increase and diminution—the limits being 0.0198 in. and 0.0322—the former, or lesser diurnal variation, corresponding to the middle of January, and the latter or greater to the beginning of July.

4th, That these fluctuations are maintained with such regularity, that there is not a single month in the fifty-eight examined, in the mean of which the daily oscillation does not appear; and that in the annual oscillation (with exception of one remarkable anomaly, produced by the tremendous storm of July 1831) not only does every year exhibit the fluctuations in question, but its progress is marked by similar stages, or phases of increase and diminution; the most remarkable of which is a temporary suspension of the regular rapid rise of the mercury towards its maximum, usually taking place about the latter end of May or beginning of June.

5th, That, contrary to usually received notions, the rainy season at the Cape corresponds to a *generally* elevated state of the barometer, although it is true that particular storms of wind and rain are often marked by a temporary depression.

Sir J. Herschel further observed, that the amount of the annual barometric variation at the Cape corresponds pretty nearly with the amount of a depression of the mercury, which he stated to have been observed by himself in his voyage hither, at and near the equator, below its habitual state in the extra-tropical regions—a depression then

noticed, as he at that time supposed for the first time, but which it appears had also been (very recently) noticed and made the subject of inquiry and numerical computation by Professor Schow of Copenhagen, in a paper published in the Annales de Chimie for June 1833.

Sir J. Herschel also farther stated, that the mean annual barometric fluctuation at Calcutta, on the average of between two and three years' observations made by Mr. Prinsep, examined by him, appears to be much greater than that at the Cape, and, what is very remarkable, in a contrary direction, the maximum of Calcutta corresponding to the minimum at the Cape. And he attributes this to an actual bodily transfer of a portion of air from hemisphere to hemisphere, by the alternate heating and cooling of the two hemispheres, as the sun crosses from side to side of the equator. The effect of this cause, which he considers to be general over the whole earth, will be to modify the regular and constant effects of the Trades, by a set of periodical winds differing materially in their character from local monsoons, and to this cause he is disposed to attribute the observed annual oscillation of the extreme north and south limits of the Trade winds.

The northern hemisphere, he further observed, being, by reason of its greater quantity of land, more superficially heated than the southern, it should be expected that the mean pressure beyond the southern tropic should exceed that beyond the northern, and he suggested this as a subject worthy of examination by meteorologists properly situated in both hemispheres.

Lastly, he observed, that severe gales, occurring whether in summer or winter, appear to depend on causes entirely extraneous to the regular periodical fluctuations of pressure, and are probably dependent on causes of a local and transient nature—but that *a correspondence of extraordinary seasons* in distant parts of the globe, may be expected to accompany great occasional deviations from the usual law of these fluctuations in any given place, and that it is far from impossible that an assiduous attention to this point may ultimately enable us to predict their occurrence.

The series of observations at the Port-Office being still in progress, the foregoing results are not considered as final; but whatever modifications future years' observations may necessitate, will be from time to time inquired into and reported.—*Edinburgh New Philosophical Journal for July—October* 1836.

Literary and Scientific Intelligence, and Miscellanea.

Encouragement to Science by the Honourable the Court of Directors of the East India Company.—Having now dwelt at some length upon those aids and encouragements to science which emanate from public societies and institutes formed for that express purpose, we must be allowed to advert to another association, whose objects, indeed, are commercial, but whose patronage of science in all that relates to the civil and natural history of Asia is without parallel, and entitles The Honourable Company of Merchants trading to the East Indies, not only to a place among the scientific institutions of this empire, but to rank with the first and foremost of those in Europe. We here look to this Company only in its connection with the literature and science of the East. The liberality which the different Courts of Directors have shown, for a long series of years, in bringing to light the ancient records of that vast empire over which their authority extends, is attested by the publications these materials have given rise to, and the efficient patronage that has uniformly been extended to their authors. Every thing, in short, which could illustrate the ancient state of those singular nations now under the dominion of Britain, has been studiously sought for by the servants of the Company, and deposited in their archives. The Asiatic Society, celebrated for its learned Transactions since the days of Sir Wm. Jones, owed its origin to their fostering care; while the splendid library and collection of Oriental MSS. at the India House attest the feelings which have so long pervaded their councils. If we turn, on the other hand, to what has been done for elucidating the natural history of their possessions, the result is still more conspicuous. A botanical garden, worthy of an eastern monarch, superintended by distinguished botanists, having at their command all necessary assistants, has disseminated the splendours of the Indian flora over all similar establishments in Europe. Yet this liberality is not confined to public gardens, or to favoured botanists. Any individual of respectability, upon his return to Europe, may receive a collection of seeds and roots from these gardens, free of expense. Nor are these all the benefits resulting to the botanical world from the munificence of the Company. The different provinces of India have been explored by competent botanists; and thousands and tens of thousands of dried specimens, prepared under their superintendence, have been transmitted to England, arranged into separate collections, and then distributed among the scientific botanists of Europe. The same patronage has been extended to every thing regarding zoology. No sooner had the British arms

taken possession of Java, than arrangements were made for securing the services of Dr. Horsfield, an eminent naturalist then residing in the island, and his valuable collections were made over to the Company. On the arrival of Dr. Horsfield in this country, these scientific treasures were deposited in the India House; and when suitable arrangements had been made in the museum for their reception, they were opened to the public and to men of science: and the "Zoological Researches in Java" were soon after published, under the Company's patronage. The chief results of Dr. Horsfield's discoveries being thus given to the world, the rich collection of duplicate specimens was ordered to be distributed, like those of the plants, among the different public museums, and the eminent zoologists, both in Britain and on the Continent. The splendid collection of insects, equally rich in duplicates, will, no doubt, be employed in a manner equally calculated to benefit science, so soon as the honour attached to their discovery and investigation has been secured. In short, in whatever light we view the scientific patronage exercised by the India Company, it is scarcely possible to do justice to that munificent spirit which is apparent in all the details.—*A Preliminary Discourse on the Study of Natural History.—By William Swainson, Esq.*—Cab. Cyc. p. 329—331.

Dr. Buckland's *Geology and Mineralogy*—The Sivatherium.—The long expected volumes of the Bridgewater Treatises, containing Dr. Buckland's treatise on Geology and Mineralogy, have, at length, reached India. The following passage relates to the interesting fossil, an account of which appeared in the 12th number of this Journal.

"An account has recently been received from India of the discovery of an unknown and very curious fossil ruminating animal, nearly as large as an elephant, which supplies a new and important link in the Order of Mammalia, between the Ruminantia and Pachydermata. A detailed description of this animal has been published by Dr. Falconer and Captain Cautley, who have given it the name of Sivatherium, from the Sivalic or Sub-Himalayan range of hills in which it was found, between the Jumna and the Ganges. In size it exceeded the largest Rhinoceros. The head has been discovered nearly entire. The front of the skull is remarkably wide, and retains the bony cores of two short thick and straight horns, similar in position to those of the four-horned Antelope of Hindostan. The nasal bones are salient in a degree without example among Ruminants, and exceeding in this respect those of the Rhinoceros, Tapir, and Palæotherium, the only herbivorous animals that have this sort of structure. Hence there is no doubt that the Sivatherium was invested with a trunk like the Tapir. Its jaw is twice as large as that of a Buffalo, and larger than that of a Rhinoceros. The

remains of the Sivatherium were accompanied by those of the Elephant, Mastodon, Rhinoceros, Hippopotamus, several Ruminantia, &c.

"It is stated (p. 88) that there is a wider distance between the living Genera of the Order Pachydermata than between those of any other Order of Mammalia, and that many intervals in the series of these animals have been filled up by extinct Genera and Species, discovered in strata of the Tertiary series. The Sivatherium forms an important addition to the extinct Genera of this intermediate and connecting character."—*Supplementary Notes.*

In the number of the *Journal of the Asiatic Society of Bengal* for February 1837, we find an account and representations of further fragments of this very interesting fossil animal, from which we extract the following.

"*Additional fragments of the Sivatherium.*—Before Colonel Colvin's departure for Europe, we requested permission to take a cast of the beautifully preserved lower jaw of the *Sivatherium* which he exhibited at the Government House scientific party in January last. In further token of his zeal for science, and of his ever readiness to oblige, he has, even in the hurry of embarkation, favoured us with the accompanying lithographic drawings of the same jaw, and of the larger fragment of the occiput also on its way to adorn some cabinet of fossil osteology of his native land. This fragment is the more valuable on account of its being perfect in the parts deficient in Dr. Falconer's specimen.

"'I herewith send you two plates of the *Sivatherium*, one of the portion of the head I was fortunate in having brought in from the lower hills below and west of *Náhan* just before I left *Dádúpur.* It arrived encumbered with a good deal of hard sandstone matrix, most of which I had cleared away. This specimen is valuable, though it has no teeth, from having the occiput very entire, and from its proving the accuracy of Dr. Falconer's assumption, founded on examination of the original head, that the animal had four horns with bony cores, as this has the offset of one of the back branched horns very clearly marked; suitable to which I may mention that Captain Cautley has found in his collection a large flat horn.

"'For the left lower jaw of the *Sivatherium*, I am indebted to Conductor W. Dawe, of the Canal Department, for whom it was brought in, inclosed in a mass of similar sandstone, from near the sources of the *Sombe* river, north of *Dádúpur* and east of *Náhan*, shortly before I came away. It is a very perfect and beautiful specimen, with its molars, four in number, almost quite entire, and is the specimen which you have moulded.'"

Fossil Remains of naked Mollusks, Pens, and Ink-Bags of Loligo.—It is well known that the common Cuttle Fish, and other living species of Cephalopods,* which have no external shell, are protected from their enemies by a peculiar internal provision, consisting of a bladder-shaped sac, containing a black and viscid ink, the ejection of which defends them, by rendering opaque the water in which they thus become concealed. The most familiar examples of this contrivance are found in the Sepia vulgaris, and Loligo of our own seas.

It was hardly to be expected that we should find, amid the petrified remains of animals of the ancient world (remains which have been buried for countless centuries in the deep foundations of the earth), traces of so delicate a fluid as the ink which was contained within the bodies of extinct species of Cephalopods, that perished at periods so incalculably remote; yet the preservation of this substance is established beyond the possibility of doubt, by the recent discovery of numerous specimens in the Lias of Lyme Regis,† in which the ink-bags are *preserved* in a fossil state, still distended, as when they formed parts of the organization of living bodies, and retaining the same jux-taposition to a horny pen, which the ink-bag of the existing Loligo bears to the pen within the body of that animal.

Having before us the fact of the preservation of this fossil-ink, we find a ready explanation of it, in the indestructible nature of the carbon of which it was chiefly composed. Cuvier describes the ink of the recent Cuttle Fish as being a dense fluid of the consistence of pap "bouillie," suspended in the cells of a thin net-work that pervades the interior of the ink-bag; it very much resembles common printers' ink. A substance of this nature would readily be transferred to a fossil state, without much diminution of its bulk.‡

* The figure of the common Calmar, or Squid (Loligo Vulgaris Lam.—Sepia loligo of Linnæus), illustrates the origin of the term Cephalopod, a term applied to a large family of molluscous animals, from the fact of their feet being placed around their heads. The feet are lined internally with ranges of horny cups, or suckers, by which the animal seizes on its prey, and adheres to extraneous bodies. The mouth, in form and substance resembles a Parrot's beak, and is surrounded by the feet. By means of these feet and suckers the Sepia octopus, or common Poulpe (the Polypus of the ancients), crawls with its head downwards, along the bottom of the sea.

† We owe this discovery to the industry and skill of Miss Mary Anning, to whom the scientific world is largely indebted, for having brought to light so many interesting remains of fossil Reptiles from the Lias at Lyme Regis.

‡ So completely are the character and qualities of the ink retained in its fossil state, that when, in 1826, I submitted a portion of it to my friend Sir Francis Chantrey, requesting him to try its power as a pigment, and he had prepared a drawing with a triturated portion of this fossil substance; the drawing was shown to a celebrated painter, without any information as to its origin, and he immediately pronounced it to be tinted

In a communication to the Geological Society, February 1829, I announced that these fossil ink-bags had been discovered in the Lias at Lyme Regis, in connexion with horny bodies, resembling the pen of a recent Loligo.

These fossil pens are without any trace of nacre, and are composed of a thin, laminated, semi-transparent substance, resembling horn. Their state of preservation is such as to admit of a minute comparison of their internal structure with that of the pen of the recent Loligo; and leads to the same result which we have collected from the examination of so many other examples of fossil organic remains; namely, that although fossil species usually differ from their living representatives, still the same priniciples of construction have prevailed through every cognate genus, and often also through the entire families under which these genera are comprehended.

The petrified remains of fossil Loligo, therefore, add another link to the chain of argument which we are pursuing, and aid us in connecting successive systems of creation which have followed each other upon our Planet, as parts of one grand and uniform Design. Thus the union of a bag of ink with an organ resembling a pen in the recent Loligo, is a peculiar, and striking association of contrivances, affording compensation for the deficiency of an external shell, to an animal much exposed to destruction from its fellow-tenants of the deep; we find a similar association of the same organs in the petrified remains of extinct species of the same family, that are preserved in the ancient marl and limestone strata of the Lias. Cuvier drew his figures of the recent Sepia with ink extracted from its own body. I have drawings of the remains of extinct species prepared also with their own ink; with this fossil ink I might record the fact, and explain the causes of its wonderful preservation. I might register the proofs of instantaneous death detected in these ink-bags, for they contain the fluid which the living sepia emits in the moment of alarm; and might detail further evidence of their immediate burial, in the retention of the forms of these distended membranes; since they would speedily have decayed, and have spilt their ink, had they been exposed but a few hours to decomposition in the water. The animals must therefore have died *suddenly*, and been *quickly* buried in the sediment that formed the strata, in which their petrified ink and ink-bags are thus preserved. The preservation also of so fragile a substance as the pen of a Loligo, retaining traces even of its minutest fibres of growth, is not

with sepia of excellent quality, and begged to be informed by what colour-man it was prepared. The common sepia used in drawing is from the ink-bag of an oriental species of cuttle-fish. The ink of the cuttle-fishes, in its natural state, is said to be soluble only in water, through which it diffuses itself instantaneously; being thus remarkably adapted to its peculiar service in the only fluid wherein it is naturally employed.

much less remarkable than the fossil condition of the ink-bags, and leads to similar conclusions.*

We learn from a recent German publication (Zeiten's Versteinerungen Württembergs. Stuttgart, 1832, Pl. 25 and Pl. 37), that similar remains of pens and ink-bags are of frequent occurrence in the Lias shale of Aalen and Boll.† Hence it is clear that the same causes which produced these effects during the deposition of the Lias at Lyme Regis, produced similar and nearly contemporaneous effects, in that part of Germany which presents such identity in the character and circumstances of these delicate organic remains.

Paley has beautifully, and with his usual felicity, described the Unity and Universality of Providential care, as extending from the construction of a ring of two hundred thousand miles diameter, to surround the body of Saturn, and be suspended, like a magnificent arch, above the heads of his inhabitants, to the concerting and providing an appropriate mechanism for the clasping and reclasping of the filaments in the feather of the Humming-bird. The geologist descries a no less striking assemblage of curious provisions, and delicate mechanisms, extending from the entire circumference of the crust of our planet, to the minutest curl of the smallest fibre in each component lamina of the pen of the fossil Loligo. He finds these pens uniformly associated with the same peculiar defensive provision of an internal ink-bag, which is similarly associated with the pen of the living Loligo in our actual seas; and hence he concludes, that such a union of contrivances, so nicely adjusted to the wants and weaknesses of the creatures in which they occur, could never have resulted from the blindness of chance, but could only have originated in the will and intention of the Creator.—*Bridgewater Treatises.—Buckland's Geology and Mineralogy.* Vol. I. p. 303—310.

* We have elsewhere applied this line of argument to prove the sudden destruction and burial of the Saurians, whose skeletons we find entire in the same Lias that contains the pens and ink-bags of Loligo. On the other hand, we have proofs of intervals between the depositions of the component strata of the Lias, in the fact, that many beds of this formation have become the repository of Coprolites, dispersed singly and irregularly at intervals far distant from one another, and at a distance from any entire skeletons of the Saurians, from which they were derived; and in the further fact, that those surfaces *only* of the Coprolites, which lay *uppermost* at the bottom of the sea, have often suffered partial destruction from the action of water before they were covered and protected by the muddy sediment that has afterwards permanently enveloped them. Further proof of the duration of time, during the intervals of the deposition of the Lias, is formed in the innumerable multitudes of the shells of various Mollusks and Conchifers which had time to arrive at maturity, at the bottom of the sea, during the quiescent periods which intervened between the muddy invasions that destroyed, and buried suddenly the creatures inhabiting the waters, at the time and place of their arrival.

† As far as we can judge from the delineations and lines of structure in Zeiten's plate, our species from Lyme Regis is the same with that which he has designated by the name of Loligo Aalensis; but I have yet seen no structure in English specimens like that of his Loligo Bollensis.

New method of Boring.—An economical and easy method of sinking Artesian Wells and boring for coal, &c. has recently been practised near Saarbrück, by M. Sellow. Instead of the tardy and costly process of boring with a number of iron rods screwed to each other, one heavy bar of cast-iron about six feet long and four inches in diameter, armed at its lower end with a cutting chisel, and surrounded by a hollow chamber, to receive through valves, and bring up the detritus of the perforated stratum, is suspended from the end of a strong rope, which passes over a wheel or pulley fixed above the spot in which the hole is made. As this rope is raised up and down over the wheel, its tortion gives to the bar of iron a circular motion, sufficient to vary the place of the cutting chisel at each descent.

When the chamber is full, the whole apparatus is raised quickly to the surface to be unloaded, and is again let down by the action of the same wheel. This process has long been practised in China, from whence the report of its use has been brought to Europe. The Chinese are said to have bored in this manner to the depth of 1000 feet. M. Sellow has with this instrument lately made perforations 18 inches in diameter, and several hundred feet deep, for the purpose of ventilating coal mines at Saarbrück. The general substitution of this method for the costly process of boring with rods of iron, may be of much public importance, especially where water can only be obtained from great depths.—*Ibid.*—p. 568.

Proceedings of the Zoological Society of London.—Indian Antelope. —Mr. Bennett directed the attention of the Meeting to an interesting series of the *Indian Antelope, Antelope Cervicapra,* Pall., now at the Society's Gardens. It consists of four individuals: an adult and aged male, brought by Col. Sykes from Bombay, and presented by him to the Society nearly five years ago; a younger, yet adult, male, which was presented, in an immature condition, about two years since; an immature male, lately arrived in the Menagerie, and in about the same state of development as that in which the last-mentioned individual was when it was originally presented; and an emasculated individual of full growth. In the older of these *Antelopes* the rich deep colour of the body generally is so intense as almost to approach to black, and the horns are strong and fully developed: the possession of horns and the depth of colouring, which are peculiar to the male sex, are exhibited in it at their maximum. The second individual approximates nearly to it in the degree in which these secondary sexual characters are developed. In the third, the youngest of the series, there exist the horns

characteristic of the male, but these organs are yet of small growth, are only beginning to be annulated at their base, and are commencing their first spiral turn; its colour, as is very generally the case among the young of animals that in adult age are differently coloured in the sexes, is that of the female, which in this instance is a dull fawn with a pale stripe along the side: it has, consequently, in these two striking particulars, full evidence of immaturity. The emasculated individual was probably, at the period when that accident or operation occurred which prevented the development of its sexual characters, at nearly the same age as the one last adverted to: it has since continued to increase in bulk, and it even exceeds in size, as often happens in castrated animals, the perfect adult male of the same species: but the secondary sexual characters of the male have not been developed in it: it retains the dull fawn colour of immaturity, and its horns have not acquired the strength, the annulation, or the spiral turns which belong to those of the adult and perfect male. One of the horns has been broken off; perhaps the more readily from some weakness in its structure, consequent on its unimportance to an animal so degenerated: the other retains at a short distance from its normally formed tip, a few rings, but beyond these the surface has become smooth, the substance remains weak and comparatively small, and the direction, instead of being in a succession of spiral turns, is in a single sweep, passing backwards above the base of the ear and then descending along the curve of the neck: it has, though weaker, much of the character of the horns of the African race of *Sheep*. The general appearance of the animal is also sheep-like and tame.

Mr. Bennett proceeded to remark that these animals, although curious and interesting on account of the variations exhibited by them, in accordance with their several conditions, in those acknowledged secondary sexual characters, colour and horns, were yet more interesting when considered with reference to the state of another organ, the use of which has long remained a problem to zoologists, but which, it appeared to him, must be referred to sexual relations; he alluded now to the lacrymal sinus. Referring to its structure as to that of a sac, opening externally by a lengthened slit, but perfectly closed within, he remarked, that that organ could not possibly be in any degree connected with the functions of respiration; there being no aperture through it for the passage of air. Its inner surface is covered by a smooth skin, with a few scattered and very short bristles, and is defended by a dark coloured and copious secretion of ceruminous matter, which has a slight urinous or sexual odour. He did not feel himself competent, he stated, to explain the precise manner in which this organ is available for sexual purposes; yet he felt convinced that such is its use, from the consider-

ation of its relative development in the several *Indian Antelopes* of the Society's Menagerie.

In the more aged of these individuals, as indeed in the adult *Indian Antelope* generally, the large cutaneous follicle beneath the eye known as the lacrymal sinus, is so prominent as to form a most striking feature in the animal's physiognomy: it never appears as a simple slit, its thickened edges pouting so widely as to be at all times partially everted. When the animal is excited, and it is constantly highly excitable, the eversion of the bag becomes complete, and its thick lips being thrown widely back, the intervening space is actually forced forwards so as to form a projection instead of a hollow: the animal is, on such occasions, delighted to thrust repeatedly the naked lining of the sac against any substance that is offered to him, which soon becomes loaded with the odour that has been referred to as belonging to the secretion. In the second individual, although it is perfectly mature, the protrusion of the inner surface of the sac is not quite to so great an extent as in the more aged male; and the less thickened edges of the sinus allow of a nearer approximation to its closure in the unexcited state of the animal. The youngest male has the lips of the sinus small and closely applied to each other, so as to hide completely the whole of the internal lining of the sac, and to exhibit, externally, a mere fissure: in it the lips are but slightly moved when the animal is interested. The emasculated individual, notwithstanding its full growth, has its suborbital sinus, nearly in the same condition as that of the immature male: it is merely a slight fissure, the edges of which are closely applied to each other; and in it those edges do not appear to be at all moved, the animal being generally careless and inanimate. It would consequently seem that the same cause which induced the retention, by this individual, of its immature colours, and which arrested the perfect growth of its horns, was adequate also for the checking of the development of the suborbital sinuses. Those organs, therefore, would appear to be dependent on sexual perfection; and consequently to be, in some manner yet to be ascertained, subservient to sexual purposes, with the capacity for which they are evidently, in the phases of their development, essentially connected.

Mr. Owen, who had conceived it possible that the secretion of these glands, when rubbed upon projecting bodies, might serve to direct individuals of the same species to each other, remarked that he had endeavoured to test the probability of this supposition by preparing a tabular view of the relations between the habits and habitats of the several species of *Antelope*, and their suborbital, maxillary, post-auditory, and inguinal glands; in order to be able to compare the presence and degrees of development of these glands with the gregarious and other

habits of the *Antelope* tribe. He stated, however, that it was evident from this table, that there is no relation between the gregarious habits of the *Antelopes* which frequent the plains, and the presence of the suborbital and maxillary sinuses; since these, besides being altogether wanting in some of the gregarious species, are present in many of the solitary frequenters of rocky mountainous districts. The supposition, therefore, that the secretion may serve, when left on shrubs or stones, to direct a straggler to the general herd, falls to the ground.

Mr. Ogilby remarked, with reference to this subject, that he had had opportunities of observing, at the Surrey Zoological Gardens, a female of the *Indian Antelope*, in which, when he first saw her, the lacrymal sinus was in a state of quiescence: but when he observed her again, a month afterwards, and probably in improved condition, that organ was in a state as excitable as it is in the old male of the Society's Gardens. He added, as a general remark, which, however, he stated was not universal, that in intertropical animals the lacrymal sinus is larger than in more northern species, and in those whose range is limited to mountainous districts.

He also described the lacrymal sinus of a species of *Gazelle*, which he had observed after death: it consisted of a gland furnished with six excretory ducts placed nearly in a circle, and with one central duct: from the orifices of these ducts, when squeezed, there issued out strings of a dense ceruminous matter.

Mr. Bennett stated in conclusion, that since making his observations on the *Indian Antelope*, which had led him to form the opinion he had advanced with respect to the use of the lacrymal sinus, he had received from Mr. Hodgson of Nepal, a Corresponding Member of the Society, a letter in which, among other subjects, some remarks are made on this organ as it exists in the *Thar Antelope*, and in the *Cervus Aristotelis*: in the former of those animals, Mr. Hodgson's observations prove that during the breeding-season the lacrymal sinus is in a high state of activity. Mr. Hodgson's letter, which is dated Nepal, June 18, 1835, refers also to other glands in some other *Antelopes*, as will be seen by the following extract.

"The *Chiru Antelope* has exceedingly large inguinal sacs, which hang by a long narrow neck from the loins. The longitudinal quasi maxillary gland of the *Cambin Otan* I doubt the existence of, and believe its 'suborbital sinus' to be similar to that of *Thar*.

"The latter differs essentially from that organ in any *Deer* or *Antelope* I have seen; being furnished with a huge gland, filling the whole cavity or depression on the scull, and leaving the cuticular fold void of hollowness: it is filled up, like the bony depression, by the gland;

whereas the gland of this sinus, in most *Deer* and *Antelopes*, is a tiny thing, and a dubious one. As to any *Cervine* or *Antilopine* animal breathing through the suborbital sinus, it cannot be, unless they can breathe through bone and skin! If you pass a fine probe down the lacrymal duct, you see the probe through the bottom of the osseous depression holding the cuticular fold called the suborbital sinus. But, however thin the plate of bone at the bottom of the former, it is there, without breach of continuity; and the cuticular portion of the apparatus has a continuous course throughout, leaving no access to the inside of the head. I am watching closely a live specimen of *Cervus Aristotelis*, to discover, if I can, the use of this organ. In a recently killed male of this species, I passed a pipe into the nose, up to the site of the suborbital sinus, and tried, in vain, for half an hour, with the aid of a dozen men's lungs, to inflate the sinus. Not a particle of air would pass; nor could I cause the sinus to unfold itself, as the live animal unfolds it, by means of a set of muscles disposed crosswise round the rim of it. In dissecting the sinus, I found only a feeble trace of a gland; so, also, in the *Muntjac*.

"But in the *Thar*, the gland is conspicuous, being a huge lump of flesh, bigger than, and like in shape to, the yolk of an egg. The live *Thar*, too, in the spring especially, pours out a continuous stream of thin viscid matter from the sinus; not so in any *Deer*. The *Thar* gland seems to me connected with the generative organs: and I take its profuse secretion to be a means of relieving the animal (when it has no mate particularly) from the extraordinary excitement to which it is liable in the courting-season. I have witnessed that excitement, and have been amazed at its fearful extent, topical and general, for six weeks and more.

"The *Chiru's* labial sacs, or intermaxillary pouches, are, most clearly, accessory nostrils, designed to assist breathing at speed. They spread with the dilatation of the true nostril, and contract with its contraction. This species has but five molar teeth on each side of either jaw." B. H. H.—*Philosophical Magazine, No.* 54, *October* 1836.

A paper by B. H. Hodgson, Esq., Corr. Memb. Z. S., on some of the *Scolopacidæ* of Nipâl, was read; the copy transmitted by that gentleman to the Society containing various corrections of his memoir which was published at Calcutta in the 'Gleanings of Science' for August, 1831.

Mr. Hodgson's object in the present paper is to bring under the notice of zoologists the various species of the family referred to which occur in Nipâl, on the natural history of which country he has, during a residence of several years, been engaged in making most extensive re-

searches. The result of these it is his intention immediately to publish, accompanied by finished representations of the animals, taken from drawings made in almost every instance from numerous living individuals of the several races.*

Mr. Hodgson first describes in detail the *common Woodcock, Scolopax Rusticola*, Linn., as it occurs in Nipâl; where it is, in every respect of form and colour, evidently identical with the European bird. In Nipâl also it seems to be, as it is in Western Europe, of migratory habits: and the periods of its arrival in, and departure from, Nipâl, correspond altogether with the seasons of its appearance and disappearance in England.

He then proceeds to describe in detail the several kinds of *Snipe* which occur in Nipâl.

Two of these are so nearly related to the *common Snipe* of Europe, *Gallinago media*, Ray, that Mr. Hodgson is induced to regard them as being probably specifically identical with that bird: and he accordingly refers them to it as varieties, which are constantly distinguished from each other by the structure of the tail. In one of them the tail-feathers are fourteen or sixteen in number, and are all of the same form: in the other the tail-feathers vary in number from twenty-two to twenty-eight; and the outer ones on either side, to the number of six, eight, or ten, differ remarkably from those of the middle, being narrow, hard, and acuminated. The latter bird may, however, be regarded as the representative of a species to which the name of *Gall. heterura* may be given.

The other two *Snipes* of Nipâl are unquestionably distinct from those of Europe. They are described as the *solitary Snipe, Gall. solitaria*, Hodgs., and the *Wood Snipe, Gall. nemoricola*, Ej.

In the *solitary Snipe* the wings are remarkably long; the upper surface, especially on the wings, is minutely dotted, barred, and streaked, with white intermingled with buff and brown; and the *abdomen* is white, barred along the flanks with brown.

The *Wood Snipe* has the general colouring of the plumage dark and sombre; the wings short; the *abdomen* and the whole of the under sur-

* We learn from Mr. Hodgson, and from the *Journal of the Asiatic Society of Bengal*, that many of the drawings to serve as illustrations to the projected work, have been sent to Europe from Calcutta, to be put into the hands of Artists there. These drawings were exhibited at the scientific *soirees* of Lord AUCKLAND, and excited general admiration. The Editor of the Bengal Journal designates them as a "magnificent series of illustrations." The indefatigable industry, great talents, and extraordinary tact in the observation of the natural forms and habits of animals, possessed by Mr. Hodgson, render it quite certain that this work will far surpass any that have yet appeared on Indian Zoology. We cannot too much admire the conduct of this high civil functionary, in thus devoting the time which he can spare from the official duties of his exalted station, to the prosecution of scientific labours of this kind. The Indian community, and the cultivators and admirers of science, should testify their appreciation of such exertions, by subscribing to the work, so as to prevent the chance of any pecuniary loss to the disinterested author in the prosecution of his costly undertaking.—*Editor Madras Journal.*

face thickly barred with transverse lines of dark brown, on a dusky white ground; and a tail of sixteen or eighteen, or very rarely twenty feathers.

Mr. Hodgson describes, with the greatest minuteness, each of these birds, and adverts with the fullest detail to their several habits and distinguishing peculiarities, as well of manners and of seasons as of form and plumage.—*Ibid*, No. 52.

Proceedings of the Royal Astronomical Society of London.—Sir J. Herschel states, that he has nearly gone over the whole south circumpolar region, to 60° from the pole; the observations of which are in the course of arrangement. He is somewhat surprised at the extraordinary paucity of *close double* stars, which cannot arise from want of power in the telescope, or from the nature of the climate: for he considers his mirrors as perfect as it is possible to make them; and he represents the beauty and tranquility of the climate to be such, that the stars are reduced to all but mathematical points, and thus allow of their being viewed like objects under a microscope. But although the number of double stars is so small, considering the richness of the southern heavens in stars, yet he represents the *nebulæ* as very copious; and has accordingly collected a numerous list, which will doubtless, in due time, be laid before the public.

Extract of a Letter from Captain Smyth to the President, containing the translation of a notice from M. Cacciatore:

"One important thing I must communicate to you. In the month of May I was obsérving the stars that have proper motion; a labour that has employed me several years. Near the 17th star, 12th hour, of Piazzi's Catalogue, I saw another, also of the 7-8th magnitude, and noted the approximate distance between them. The weather not having permitted me to observe on the two following nights, it was not till the third night that I saw it again, when it had advanced a good deal, having gone further to the eastward and towards the equator. But clouds obliged me to trust to the following night. Then, up to the end of May, the weather was horrible; it seemed in Palermo as if winter had returned: heavy rains and impetuous winds succeeded each other, so as to leave no opportunity of attempting anything. When at last the weather permitted observations at the end of a fortnight, the star was already in the evening twilight, and all my attempts to recover it were fruitless: stars of that magnitude being no longer visible. Meanwhile the estimated movement, in three days, was 10″ in AR, and about a minute, or rather less, towards the north. So slow a motion would make me suspect the situation to be beyond *Uranus*. I was exceedingly grieved at not being able to follow up so important an examination."—*Ibid.*

On the discovery of the Tea Plant in a Province of British India.

(Extract from an Article by M. Alphonse De Candolle in the *Bibliotheque Universelle* of Geneva).

A Committee, established at Calcutta for the culture of Tea, has been employed in seeking, in the vast extent of the Anglo-Indian territory, the best locality for cultivating the precious shrub of China. To this end the Committee directed its attention to the Province of Assam on the borders of the Chinese Empire, and required from the European Officers stationed there information on the nature of the country. In reply, Captain Jenkins, in a letter, dated 7th January 1834, states that the mountainous region situated between Cachar and Assam, must be extremely favourable to the culture of Tea, as there are found there numerous species of *Camellia*, a genus much resembling the Tea, and that, in the district of Beesa, "a coarse variety of the tea plant is indigenous."

Notwithstanding, the celebrated Dr. Wallich, Superintendent of the Botanic Garden of Calcutta, appears to have doubted this assertion, emanating from an officer who is no botanist. He knew how much the leaf of the Tea plant resembles that of certain Camellias which grow in the mountains to the north of India, and he deferred a decision until he had seen specimens. Captain Jenkins was not slow in forwarding them. After an examination which he was then enabled to make of the leaf and fruit of the Assam tea, Dr. Wallich entertained no further doubt. It is indeed the Tea of China which grows in this part of the English territory, as the figure and brief notice of Dr. Wallich,* which we have before us, plainly testify. It remains to know whether this wild tea possesses the perfume of that cultivated in China, and whether the province of Assam offers favourable conditions for the culture of Tea, and for the delicate preparation of the leaves.

Captain Jenkins, having communicated the circular of the Calcutta Committee to Lieutenant Charlton, established in the province of Upper Assam, speedily procured accounts full of interest. Lieutenant Charlton was already aware of the existence of tea in Assam. He had even despatched living plants of it to the Calcutta Garden three years before, which he understood to have decayed. It was from the hills of Beesa that they were obtained. Many plants attain the height of 12 or 14 feet. He describes them from memory, in a letter to Captain Jenkins, and declares that he has no doubt of its being a species of tea. "I have not had an opportunity" says he "of making any experiment on the leaves; they are described as small in their green state, but

* Journal of the Asiatic Society of Bengal, Jan. 1835,

acquire the fragance and flavour of Chinese tea when dried. The Singphos and Kamtees are in the habit of drinking an infusion of the leaves, which I have lately understood they prepare by cutting them into small pieces, taking out the stalks and fibres, boiling and then squeezing them into a ball, which they dry in the sun and retain for use."

This coarse mode of preparing tea is not unfrequent in the countries which surround China. It is said that the Tartars harden it with a kind of argillaceous earth, which they convey about in the shape of cakes, and that they eat it in that form, or drink it in infusion. We can testify from experience that it is a detestable beverage; but the palate of these barbarians is more gratified by the pungent flavour of the leaf, than by the delicious aroma, which exhales when it is carefully selected and well prepared. The same kind of men, among ourselves, prefer gross brandy to the evanescent fragranee of choice wine.

The Burmans use the tea in all fashions—As their country borders the province of Assam towards the north, and their capital, Ava, is distant only a hundred leagues, it may be useful to cite a passage from Crawford's Journey, concerning the indigenous tea of those regions.*

"Tea is cultivated on the hills by some of the mountain races, but it does not exist nearer Ava than five days' journey, and we consequently saw none of it growing. The best is grown by the race called D'hanu, whose country lies to the north-east of Ava, distant about ten days' journey. The leaves are elliptic, oblong, and serrated like the Chinese plant; and the Burmese, not following the practice of other nations, designate the latter by the native name of their own plant, Lap'het. There is little doubt, therefore, but that it is a genuine *Thea*, and most probably a native of the country. The Burmese eat the leaf prepared with oil and garlic, and never use the infusion as they do that of Chinese tea, which they call Lap'het-re, or tea-water." The author mentions elsewhere the frequent importation of China tea to Ava by the route of internal commerce.

The difference which the Burmans make between these two teas, valuing the infusion of the China leaf, makes me fear that the wild plant, which grows to the north of their country and in the province contiguous to Assam, yields tea of but an inferior quality. I do not mean to say that it is of a different species from the true tea, in the botanical sense of the word species; but it may be a less fragrant

* Journal of an Embassy to the Court of Ava, by J. Crawford, Esq.

† In fact, Dr. Wallich, naturalist of the expedition, did not find it in the Burmese country. There is not a trace of it in the herbarium of that country, which he has confided to us, nor in the manuscript of his voyage.

variety. We know already that, in the interior of China itself, the selling price of tea varies much in different places. It is with the tea plant as with the vine, which yields very different products in places near to each other; which should not surprise us, for, besides the diversities of soil and situation, there are many differences in the period of gathering the leaves, in the number of crops, in the preparation of the leaves, and perhaps also in the kinds or varieties which have been cultivated from time immemorial in each locality. The wild tea may very likely afford a stronger and more pungent flavour, and a less delicate perfume.

This consideration, however, does not diminish, in our eyes, the interest of the English discovery. If the province of Assam which touches China, affords the tea plant spontaneously, it must be eminently fit for the culture of the plant. Supposing that the wild plant may prove of little use, the cultivated plant, especially that which may be brought from China, may prove of great advantage.

The Calcutta Committee has well determined. It has despatched Dr. Wallich to Assam. It is not the first mission of the kind of that zealous naturalist. He was sent, in 1827, to the province of Martaban, to explore the forests of teak wood. He has in like manner visited other regions of the vast empire of the British, to report on their natural resources, and he has always acquitted himself in these missions, with the ardour and talent which characterize him.

We are able to say nothing more of the results of the expedition to Assam, which is still going on.* †

Extract of a letter from Dr. Wallich, Superintendent of the Botanic Garden of Calcutta, to M. Benjamin Delessert, dated 10th August 1835.

"I purpose to start in four days, first for the mountains neighbouring Silhet, particularly Churra-Poonje, and Myrung, where I remain until October. Traversing then the mountains of Khasiya, I proceed straight to Gowahutty in Assam, and thence to Suddiya in Upper Assam on the Burrampooter, where I shall commence my investigations for the report on Tea. I shall be accompanied by a medical gentleman whose name is well known to you, as well as to M.M. Mirbel and Brongni-

* Subjoined to the above we publish an extract from a letter from Dr. Wallich, which gives some details of the early results of the journey.—*Editor* Annales.

† The particulars of this interesting expedition, so important to Commerce as well as to Science, remain to this time unknown to the public. From the talents of the gentlemen of the deputation there is no doubt but that the Reports to Government have been most ample and satisfactory, and would prove highly interesting. Incidentally something has been made known by Mr. Griffiths, through our pagesand those of the Bengal Journal, on the botany of Assam; but nothing like a narrative of the expedition has yet been promulgated.—*Editor Madras Journal.*

art, Mr. William Griffith, a young man deeply acquainted with general and physiological botany, who cannot fail to acquire great celebrity. Another gentleman of the East India Company's Medical Service, will accompany me as geologist; this is Mr. John M. Clelland, who is publishing here at this moment a work on the geology of Kemaon. I am proud to say, that it was at my recommendation that these gentlemen are attached to the mission.

"We hope to be on our return in the month of April next year, by which time the principal end of our journey will, I think, be accomplished in a satisfactory manner. This end is to make every possible research as to the locality of the true tea (wild and spontaneous) in Upper Assam. It is unnecessary to say that I calculate on making with Mr. Griffith an extensive collection of plants, and I need not add that I hope to send you specimens. I shall send the whole to the East India Company, but I shall take care expressly to request that you may have the duplicates, and I know too well the munificence of the Directors to doubt that my desire will be attended to. The government has been very liberal in the dispositions made for our mission to Assam, as well regarding me as my assistants. I take with me many draughtsmen and gardiners, and if I am able to exert the same ardour and energy as in my early expeditions, I believe we shall obtain good results. But I assure you that twenty-eight years' sojourn in India have enfeebled my mind and body; so that the best assurance of success lies in the incalculable advantage of being assisted by such excellent companions."*

Abstract of a Report on the Climate and Diseases of Van Dieman's Land, by W. Milligan, Esq. M. D., *Assistant Surgeon, H. M.* 63d *Regiment.*—The new colony of Western Australia, according to Dr. Milligan, is situated on the Western Coast of New Holland, and extends from Cape Londonderry, in latitude 13° 44′ South, to West Cape Horne, in latitude 33° 8′, and from longitude 112° 52′ to 129° from the meridian of Greenwich. The Swan River district, the one first settled, and still the most important, is situated in between latitude 32° and 33°; the entire area being about 50 miles long by 30 in breadth. The country is generally of the open forest description, the surface undulating, and covered with a great profusion of trees, shrubs, and herbaceous plants. Three rivers intersect this valley, the Swan, the Canning, and the Murray. They are subject to the influence of the tides, abound with fish, and, though generally shallow, are subject to occasional inundations, which leave extensive alluvial deposits. The Swan is navigable for

* Translated from the *Annales des Sciences Naturelles*, Fevrier, 1836.—*Editor Madras Journal.*

boats of four or five tons as high up as Perth, which is about 12 miles from the Sea Coast. Fresh water lagoons are numerous; there are also others containing salt-water. The water of the wells, though at first indifferent, from not having been procured from a sufficient depth, is excellent. It sparkles in the glass, cooks food, and washes linen well and speedily, and may be drank freely without relaxing the stomach. The strongest winds are from the north-west and south-west. The north wind is the hottest, and is very sultry during summer, destroying vegetation if long continued. During the summer, there is a regular land and sea breeze, the former prevailing in the morning from the east, and the latter setting in about noon from south-west. The mornings and evenings are pleasant, and the nights cool. The sky is clear, and of a beautiful azure without cloud or rain: moderate dews descend at night. As the autumn approaches, the weather becomes less serene. The sky is occasionally overcast, with thunder-storms, which prove acceptable, however, and beneficial, mitigating the excessive heat, and rendering the fields fit for the labours of the husbandman. In winter, the winds are occasionally boisterous, endangering the shipping if exposed; it rains for the most part two or three days together, and then clears up for a somewhat longer period. In wet weather, fogs are not uncommon in the mornings and evenings in the low grounds, or along the banks of the rivers. Hail of a large size occasionally falls; snow is unknown, and ice is but rarely met with. Fires are not unwelcome in the mornings and evenings; but on the whole are to be looked on more as a luxury than a necessary. Such is the nature of the climate and locality to which Sir James Stirling proceeded in June 1829, accompanied by a detachment of His Majesty's 63d Regiment, to establish a new colony. Settlers soon commenced to arrive, and poured in rapidly, till the end of 1830, at which time, the population amounted to about two thousand. The vessels which brought them out, resembled in some measure Noah's ark, being crowded to excess with animals, birds, and plants, as well as men, women, and children, with provisions and household goods. If we can fancy the population of one of the parishes in England, mixed with a sprinkling of half pay officers, some gentlemen from the East and West Indies, and a few Cocknies, put down on the shores of a wilderness, we shall have some idea of the founders of this interesting colony. Their first object on landing was to get under shelter. Their domiciles were of course at first of a wretched description. Some had single tents; others huts of green-wood, pervious to every shower; while many had no other covering night or day than the wide canopy of heaven. Afterwards, when the settlers got on their own grants of land, their houses improved, by successive gradations, from the wooden house they had imported, or had made in the colony, to that of wattle and dub, and finally to the

more durable structure of brick or stone. As might be expected, losses from the straying of cattle in the bush, and disagreeable adventures from the travellers losing their way, were far from uncommon; accidents from explosions of gun-powder, and from the use of fire-arms by persons unaccustomed to handle them, were likewise far from unfrequent; in no instance however did any tetanic affection follow. Notwithstanding these little mishaps, matters continued to go on pleasantly enough till the beginning of the winter of 1830, when the supplies brought from England, consisting principally of salt meat, biscuit, and rum, began to fail; the harvest was indifferent; and to crown their misfortunes, after heavy rain, the rivers rose from fifteen to twenty feet above their usual level, and all who had commenced buildings on the lower grounds were obliged to desert them. From these various causes much personal fatigue and exposure were encountered, the hopes of the settlers damped, and their energies depressed; scurvy, fever, and dysentery consequently showed themselves. These diseases were principally confined to the lower orders; among the higher classes, who were better provided with the necessaries and comforts of life, and who were more temperate in their habits, there was little sickness and less mortality. With successive seasons, the harvest became more bountiful, the flocks more numerous, and scurvy has disappeared in consequence. The fevers have likewise become less prevalent, as the country has been more widely cleared and better drained. The Endemic diseases of the country appear to be principally inflammatory affections of the mucous membranes, Ophthalmia, Dysentery and Catarrh. Rheumatism is occasionally met with, in damp weather, in autumn and winter, of rather an obstinate description; and also a low fever, the *Gastro-Ente rite.* Dr. Milligan's observations on these diseases have principally reference to the locality of Perth, the capital of the colony. This town is situated on the banks of the Swan river, on a gentle elevation, 30 feet above the level of the river, and about 40 above that of the sea. It is bounded to the south by the Swan, which is here three quarters of a mile broad; to the north by a string of fresh water Lagoons, which run up to the mountains; to the east by an extensive plain terminated, by the Darling range; and to the west by Mount Eliza, which running north and south, affords considerable protection from the strong gales coming in that direction. The Swan and the Canning unite immediately below the town in a large estuary, called Melville water, which still farther reduces the temperature of the sea-breeze in its progress inland. The soil is light and sandy, with the exception of the banks of the river, which are alluvial. The substratum is sandstone.

The climate agrees with the European constitution; and every description of live stock, and of vegetable production, though collected from different climates, finds there a congenial locality. The annual mean tem-

perature is from 60° to 64°. A great advantage, which the Swan River possesses to the Indian invalid, is its proximity, the voyage from Madras having several times been performed in 25 or 30 days; it is said to be shorter by one half, than either to Sydney or Van Dieman's Land. The society is good and respectable. The best period for leaving India is February, as the intensity of the summer heat in both countries is thus avoided.

Among much other valuable information in Dr. Milligan's elaborate paper, is an interesting account of the Aborigines of the country.*—*Transactions of the Medical and Physical Society of Calcutta*, Vol. VIII. p. VI. Appendix.

Description of a Post Mortem Examination of a Tiger—By Dr. Benza, Surgeon to the Right Honourable the Governor of Madras.—The subject of the case was a full-grown male, which died in the Government Park at Madras. This animal for some days before his death had refused his food, and appeared very ill; his breathing was deep and quick, he was hot and feverish, and his belly tense and painful. In this state he remained for several days, never attempting to change his position. The body was examined twelve hours after death. The abdomen contained about five pints of very offensive thin yellow fluid. The abdominal and visceral peritoneum were highly inflamed. The ilium for about three inches of its lower third was swollen, and converted into a hard tumour, having six perforations through its coats; the widest (more than three lines in diameter), was closed by a portion of bone, and 'sharp pointed spiculæ were seen projecting through the other foramina: the colon and ilium were much contracted. Within the swollen part of intestine were many loose pieces of bone, and a round ball formed of several angular bits of bone, agglutinated and bound together by a kind of net-work of hair and wool. This ball adhered slightly to the intestines by means of an adventitious

* The paper of Dr. Milligan, which, from the brief abstract given by the Medical and Physical Society, (of which the above is a fragment), promises to afford great interest in its entire shape, must have contained much matter irrelevant to the medical pages of the Transactions, which accounts for its not having been introduced wholly. The author has promised to make over the manuscript to us when he recovers it from Calcutta; when that portion which treats of climatology, and of the Aborigines of the country, will no doubt be found suited to our pages. Australia is an interesting country, demanding enquiry and observation from all, but we have an additional motive here, from the circumstance of its being so frequently the resort of Indian invalids. Though it may seem, therefore, that we are, geographically, travelling somewhat out of our way, to introduce accounts of this country into the Journal of an *Asiatic Society*; yet we may do so with perfect propriety, as it is within our bounds politically (being to the eastward of the Cape), and, moreover, has numerous affinities to the Islands of the Eastern Archipelago, and these, again, to the continent of India, the relations of which, to Australia and to each other, it is important for the philologer and the naturalist to enquire into.—*Editor Madras Journal.*

tissue, which was highly injected. Dr. Benza remarks on the singular anomaly of finding undigested bones so low down in the intestine of an animal possessed of such digestive power as the tiger, and accounts for it by supposing, that these pieces of bone became entangled in the stomach with the wool and hair of the sheep, which formed the ordinary food of the animal; these latter substances being more indigestible than the bones, covering them with a sort of felt coat protected them from the action of the gastric juice, and thus the whole ball passed down unchanged into the intestines. At length this ball being deprived of the greater portion of its woolly covering, the spiculæ became exposed, and protruded against the intestine, greatly irritating it, thereby causing a thickening and constriction, by which the pieces of bone were held in one position, until they produced ulceration. Dr. Benza's account was accompanied by a preparation of the perforated intestine.—*Ibid*, p. xxiii.

Fall of part of Dent du Midi.—M. Elie de Beaumont read to the Geological Society of France a communication from M. Lardy upon the fall of a part of the *Dent du Midi*, one of the high Alps. This fall took place on the 26th of August 1835. M. Lardy states, that on Tuesday the 25th of August there was a violent storm in the evening all round the Dent du Midi; and it was asserted that its peak was then struck by the thunderbolt. Next day, the 26th, between ten and eleven o'clock in the morning, a very considerable portion of this peak suddenly broke off from its eastern edge, and precipitated itself with a dreadful crash upon the glacier which is situated upon the southern side of the *Dent*, and in its descent drew along with it an immense proportion of this glacier. This enormous mass of stone and ice fell into the deep ravine which separates the *Dent du Midi* from the *Col de Salenfe*, into which the torrent of St. Barthelemy runs. Speedily there issued from this gorge, through which this torrent flows to the valley of the Rhone, as it were, a mountain of black and viscid mire, on the surface of which there floated vast masses of rock of all dimensions, some of them as much as twelve feet high. This liquid mass, like a flow of lava, directed itself towards the Rhone, across the forest of pines which covers this part of the valley, drawing along with it every thing it met in its way. Trees of the largest size were overturned, and crushed like reeds. On reaching the bank of the river, it precipitated itself into it, thus forming an expanse of mud, which was fearful to behold. The fragments of rock contained in the mud were also impelled into the Rhone, whose waters were thrown to the opposite bank, and forced to re-ascend their channel to a considerable distance. The great road covered by this mire and these stones became impracticable, and it was

necessary to construct, by means of fagots, &c. a new road on this elastic soil. For many days the communications between the high and low Valais were effected by means of a bridge which was far from being stable, thrown across the torrent at the commencement of the gorge. It is impossible to conceive any thing more frightful than this ravine of from sixty to a hundred feet deep, with a breadth of from two to three hundred feet, and which augments in size as far as the Rhone, choked up with this really frozen mire, with its surface studded with great blocks of stone, and the trunks of trees. A small portion only of the peak fell to the northern side of the *Dent du Midi*, which, descending by a slope, covered a part of a glacier which is on that side. After reading this notice from M. Lardy, M. Elie de Beaumont gave some additional details regarding the phenomena, a part of which he had witnessed. He particularly insisted on what appeared especially curious as to the mode in which the muddy currents, produced by the fall, spread themselves over the great cone of debris of the torrent of St. Barthelemy, and which is at an inclination of from five to seven degrees. These torrents of mud did not contain perhaps a tenth part of water, and yet they displaced blocks of limestone several yards long, and even floated them on their surface for considerable distances, almost as easily as a river floats ice. Notwithstanding its comparatively small dimensions, this phenomenon appeared to M. Elie de Beaumont to possess a peculiar interest, as leading to conclusions respecting the mode by which the transport of diluvian blocks or boulders is effected. M. Huot, who was also an eye-witness of a part of this phenomenon, added some facts to the communication. The nature of the soil, which was composed of calcarious schist and of a black marl, must have necessarily facilitated the eboulement. A cloud of dust rose to a great height for many days after the event, which, from a distance, had all the appearance of a volcanic eruption. It was remarked, that a person might walk upon the fluid mass almost at the same instant as it was extending itself in all dimensions. At the extremity of the valley, a deep valley of erosion was hollowed out in the Taswey.—*Edinburgh New Philosophical Journal for July—October* 1836.

Trade in Chromate of Iron.—Many years ago chromate of iron was discovered by Professor Jameson in the serpentine rocks of the Shetlands, and afterwards on the mainland of Scotland. This observation was in 1820 mentioned in one of the editions of his System of Mineralogy. Afterwards, his pupil, the now well known and distinguished geologist, Dr. Hibbert, found chrome-ore in such quantities in the Shetland groups, that the quarries of it opened after his visit have realized a very considerable return to the proprietors. It is exported from the Shetlands as a raw material. Since the year 1826 this ore of iron has

become in Norway, where it was discovered by the celebrated geologist Esmark, an article of trade. It was, until the year 1831, exported in the rough state, and with but comparatively little profit to the proprietors of the ground, to Altona, Hamburgh, Petersburg, England, and Holland. In the year 1830 not less than 1133 ship-pounds were sent to Havre de Grace alone. It being considered more profitable to export the prepared chrome in place of the crude ore, a company has been got up at Drontheim for this purpose, which purposes to supply the cotton printers in Britain, France, and Germany, and also the porcelain manufactories, with prepared chrome. *—*Ibid.*

Delightful Smell on approaching tropical lands from sea.—The coast of Chili, says Poeppig, "appeared nearly to resemble the desolate region of Terra del Fuego." Even the peculiar smell was wanting which is usually perceived on approaching the coasts of countries between the tropics, and of which even animals are so sensible that they become restless, appearing to have a presentiment of the termination of their long confinement, and often boldly leap overboard to reach the shore, which they suppose to be close at hand. On this passage Poeppig says in a note,—"Whoever has made a voyage to the tropical countries of South America, or the West Indies, will always remember with pleasure the sensation which he experienced on approaching the land. Perhaps no sense is then so strongly affected as the smell, especially if you approach the coast in the early hours of a fine summer's morning. On the coasts of Cuba, the first land I saw in America, on the 30th of June 1822, all on board were struck with the very strong smell, like that of violets, which, as the day grew more warm, either ceased, or was lost amidst a variety of others, which were perceptible as we drew nearer the coast. During a long stay in the interior of this island, I became acquainted with the plant which emits such an intense perfume as to be perceived at the distance of two or three miles. It is of the species *Tetracera*, and remarkable for bearing leaves so hard that they are used by the native cabinet-makers, and other mechanics, for various kinds of work. It is a climbing plant, which reaches the tops of the loftiest trees of the forest, then spreads far around, and in the rainy seasons is covered with innumerable bunches of sweet-smelling flowers, which, however, dispense their perfume during the night only, and are almost without scent in the daytime."—*Ibid.*

* Why should Norway supply chrome to the *British* cotton printers and porcelain manufacturers, when *British* India produces abundance for the consumption of the mother country? The district of Salem, would supply all Europe, we suppose, with the ore, and the various beautiful dyes produced therefrom.—*Editor Madras Journal.*

British Association for the Advancemennt of Science.
Sixth Meeting.

The sixth meeting of this Association, held at Bristol, has been highly satisfactory in every respect, both as regards the number and the eminence of the men of science who attended, the quantity and value of the communications, and the zeal and cordiality which were manifested. A general outline of the proceedings has been given in the daily and weekly papers: we shall, we conceive, best promote the interest of science by reserving our pages as last year for authentic and official details. We may, however, just notice the subjects of two of the communications, on account of the lively interest which they excited.*

On the change in the chemical character of Minerals induced by Galvanism.—By R. W. Fox.

Mr. Fox mentioned the fact, long known to miners, of metalliferous veins intersecting different rocks containing ore in some of these rocks, and being nearly barren or entirely so in others. This circumstance suggested the idea of some definite cause; and his experiments on the electrical magnetic condition of metalliferous veins, and also on the electric conditions of various ores to each other, seemed to have supplied an answer, in as much as it was thus proved that electro-magnetism was in a state of great activity under the earth's-surface; and that it was independent of mere local action between the plates of copper and the ore with which they were in contact, was shown by the occasional substitution of plates of zinc for those of copper producing no change in the direction of the voltaic currents. He also referred to other experiments, in which two different varieties of copper ore, with water taken from the same mine, as the only exciting fluid, produced considerable voltaic action. The various kinds of saline matter which he had detected in water taken from different mines, and from different parts of the same mine, seemed to indicate another probable source of

* Influenced by the same feelings which actuate the Editor of the *Philosophical Magazine*, we have abstained from alluding to the Proceedings of the Association, further than to give the above extracts. When the authentic reports reach us, we shall give such an account of the volume, in successive numbers of this Journal, as will afford our readers a view of the present state of Science, in its various branches. By thus treating the annual publication of the Association, we shall be enabled to keep pace with the advance of knowledge, and to impart to our readers, not our own feeble ideas, but the statements of those leviathans of science, who have been selected by a congress of all the learned men of the British Isles, to report on the present state and prospects of Science, and the desiderata to which the attention of its cultivators should be directed.—*Editor Madras Journal.*

electricity; for, can it *now* be doubted, that rocks impregnated with or holding in their minute fissures different kinds of mineral waters, must be in different electrical conditions or relations to each other? A general conclusion is, that in these fissures metalliferous deposits will be determined according to their relative electrical conditions; and that the direction of those deposits must have been influenced by the direction of the magnetic meridian. Thus we find the metallic deposits in most parts of the world having a general tendency to an E. and W. or a N.E. and S. W. bearing. Mr. Fox added, that it was a curious fact, that on submitting the muriate of tin in solution to voltaic action, to the negative pole of the battery, and another to the positive, a portion of the tin was determined like the copper, the former in a metallic state, and the latter in that of an oxide, showing a remarkable analogy to the relative position of tin and copper ore with respect to each other as they are found in the mineral veins.

The Chairman (Dr. Buckland) said, it had been observed to them last evening, that the tests of some of the highest truths which philosophy had brought to light was their simplicity. He held in his hand a blacking-pot, which Mr. Fox had bought yesterday for a penny, a little water, clay, zinc, and copper; by which humble means he had imitated one of the most secret and wonderful processes of nature, her mode of making metallic veins. It was with peculiar satisfaction he contemplated the valuable results of this meeting of the Association. There was also a gentleman now at his right hand, whose name he had never heard till yesterday, a man unconnected with any Society, but possessing the true spirit of a philosopher; this gentleman had actually made no less than 24 minerals, and even crystalline quartz. He (Dr. B.) knew not *how* he had made them, but he pronounced them *to* be discoveries of the highest order: they were not made with a blacking-pot and clay, like Mr. Fox's, but the apparatus was equally humble; a bucket of water and a brickbat had sufficed to produce the wonderful effects which he would detail to them.

Artificial Crystals and Minerals.—A. Crosse, Esq., of Broomfield, Somerset, then came forward, and stated that he came to Bristol to be a listener only, and with no idea that he should be called upon to address a Section. He was no geologist, and but little of a mineralogist; he had however devoted much of his time to electricity, and he had latterly been occupied in improvements in the voltaic power, employing a battery which he had succeeded in keeping in full force for twelve months by water alone, rejecting acids entirely. Mr. C. then proceeded to state that he had obtained water from a finely crystallized cave at Holway, and by the action of the voltaic battery had succeeded in producing from that water in the course of ten days numerous rhomboidal

rystals, resembling those of the cave: in order to ascertain whether ight had any influence in the process, he tried it again in a dark cellar, and produced similar crystals in six days, with one fourth of the voltaic ower. He had repeated the experiments a hundred times, and always with the same results. He was fully convinced that it was possible to make even diamonds, and that at no distant period every kind of mineral would be formed by the ingenuity of man. By a variation of his experiments he had obtained green and blue carbonate of copper, phospate of soda, and 20 or 30 other specimens.

Mr. Crosse having also observed in a cavern in the Quantock Hills near his residence that the part of it which consisted of slate was studded with crystals of arragonite, while the limestone part was covered with crystals of ordinary carbonate of lime or calcarious spar, subjected portions of each of these substances in water to long-continued galvanic action, and obtained from the—

Slate	Limestone
Crystals of Arragonite.	Calcarious Spar.

It was mentioned to the Section on the following day, that although no doubt could be entertained of the independence and originality of Mr. Crosse's experiments, yet that he had been anticipated, in the artificial production of many of the crystallized bodies which he had formed, by M. Becquerel, and some other French chemists.—*Phil. Mag. No.* 53, *Sept,* 1836—p. 228, 230.

The following is a statement of the new and renewed Grants of Money for the advancement of particular branches of science, which have been made by the Association at this Meeting.

Mathematical and Physical Science.

250*l.* For the discussion of Observations of the Tides; at the disposal of J. W. Lubbock, Esq.

150*l.* For the discussion of Observations of the Tides in the port of Bristol; at the disposal of the Rev. W. Whewell.

70*l.* For the Deduction of the Constant of Lunar Nutation; under direction of Sir T. Brisbane, Mr. Baily, and Rev. Dr. Robinson.

30*l.* For Hourly Observations of the Barometer and Wet-bulb Hygrometer; at the disposal of W. S. Harris, Esq.

100*l.* Renewed grant for the establishment of Meteorological Observations and Experiments on Subterranean Temperature; at the disposal of a Committee, consisting of Prof. Forbes, W. S. Har-

electricity; for, can it *now* be doubted, that rocks impregnated with, holding in their minute fissures different kinds of mineral waters, may be in different electrical conditions or relations to each other? A general conclusion is, that in these fissures metalliferous deposits will be determined according to their relative electrical conditions; and that the direction of those deposits must have been influenced by the direction of the magnetic meridian. Thus we find the metallic deposits in most parts of the world having a general tendency to an E. and W. or a N.E. and S. W. bearing. Mr. Fox added, that it was a curious fact, that on submitting the muriate of tin in solution to voltaic action, to the negative pole of the battery, and another to the positive, a portion of the tin was determined like the copper, the former in a metallic state, and the latter in that of an oxide, showing a remarkable analogy to the relative position of tin and copper ore with respect to each other as they are found in the mineral veins.

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...Fahrenheit Hygr...
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ris, Esq., Prof. Powell, Col. Sykes, and Prof. Phillips, who will act as Secretary.

500*l.* Enlarged grant for the procurement of accurate Data to determine the question of the Permanence or Variability of the Relative Level of Land and Sea. The Committee consists of Mr. Baily, Mr. De la Beche, Col. Colby, Mr. Cubitt, Mr. Greenough, Mr. Griffith, Mr. Lubbock, Capt. Portlock, Mr. G. Rennie, Rev. Dr. Robinson, Prof. Sedgwick, Mr. Stevenson, and Rev. Wm. Whewell, who will act as Secretary.

100*l.* For Experimental Investigations on the Form of Waves; at the disposal of John Robison, Esq., and J. S. Russell, Esq.

500*l.* Renewed grant for the Reduction of Observations in the *Hist. Céleste* and in the volumes of the *Académie des Sciences* for 1789 and 1790; under the direction of the Astronomer Royal, F. Baily, Esq., J. W. Lubbock, Esq., and Rev. Dr. Robinson.

150*l.* For Experiments on Vitrification; under the direction of Dr. Faraday, Rev. W. V. Harcourt, and Dr. Turner.

80*l.* Renewed grant for the construction of a rock-salt Lens; under the direction of Sir D. Brewster.

Chemical and Mineralogical Science.

50*l.* Renewed grant for Researches on the Specific Gravity of Gases; under the direction of Dr. Dalton and Dr. C. Henry.

30*l.* For Researches on the Quantities of Heat developed in Combustion and other chemical Combinations; at the disposal of Dr. Turner.

15*l.* For Researches on the Composition of Atmospheric Air; at the disposal of Dr. Dalton, and Mr. W. West.

24*l.* 13*l.* For the publication of Tables of Chemical Constants drawn up by Prof. Johnston.

60*l.* For Researches on the Strength of Iron made with hot and cold blast; at the disposal of Messrs. Fairburn and Hodgkinson.

Geology and Geography.

20*l.* Renewed grant for Experiments on the Quantity of Mud suspended in the water of Rivers; under the direction of Mr. De la Beche, Mr. G. Rennie, and Rev. J. Yates.

30*l.* For special Researches on Subterranean Temperature and Electricity; at the disposal of Mr. R. W. Fox.

50*l.* For Researches into the Nature and Origin of Peat Mosses in Ireland; under the direction of Col. Colby.

Botany.

25*l.* For experimental Researches on the Growth of Plants, under glass and excluded from air, according to the plan of Mr. Ward; under the direction of Dr. Dalton, Dr. Daubeny, Rev. James Yates, and Prof. Henslow, who will act as Secretary.

Medical Science.

50*l.* Renewed grant to the Committees appointed to investigate the subject of the Anatomical Relations of the Absorbents and Veins.

50*l.* Renewed grant to the Committees appointed to investigate the Motions and Sounds of the Heart.

25*l.* For Researches into the Chemical Composition of Secreting Organs; under the direction of Dr. Hodgkin, Dr. Roget, Dr. G. O. Rees, and Dr. Turner.

25*l.* For Investigations on the Physiological Influence of Cold on Man and Animals in the Arctic Regions; at the disposal of Mr. King.

25*l.* Renewed grant for the Investigation of the Effects of Poisons on the Animal Economy; under the direction of Dr. Roupell and Dr. Hodgkin.

25*l.* Renewed grant to the Committee formerly appointed to investigate the Pathology of the Brain and Nervous System. Of this Committee Dr. O'Beirne has been requested to act as Secretary.

25*l.* For Investigations on the Physiology of the Spinal Nerves; under the direction of Mr. S. D. Broughton, Mr. E. Cock, and Dr. Sharpey.

Statistics.

150*l.* For Inquiries into the actual State of Schools in England, considered merely as to numerical analysis; under the direction of Mr. Hallam, Mr. Porter, and Col. Sykes.

Mechanical Science.

50*l.* Renewed grant for an Analysis of the Reports of the Duty of Steam-Engines in Cornwall; under the direction of Mr. Cubitt, Mr. J. Rennie, and Mr. John Taylor.—*Phil. Mag. No.* 54, *Oct.* 1836—p. 312, 314.

POSTSCRIPT.

To the Editor of the Madras Journal of Literature and Science.

My Dear Sir—Since the publication of my remarks on the Gamboge tree, I have had much correspondence with Colonel Walker respecting it; in the course of which he recalled to my recollection a circumstance which, at the time of writing, had altogether escaped my memory, namely, that he had shown me specimens collected in the cinnamon gardens of Colombo, where he believes it indigenous. He has besides mentioned several other localities in which it is found in the interior, which leaves not the slightest doubt that it is truly a native of Ceylon. In one letter he says, "it is found in great abundance along the western and eastern coast in the neighbourhood of Battacola, but I am assured by natives who know the Kara goraka or Gokatu, that it grows to a very large size in the Seven Korles quite inland, where it could not have been planted by the Dutch. * * * The Gamboge itself is as fine as any in the world. Mrs. Walker has tried the juice of two or three species, none of which mix properly with water or spirit, or are at all fit for the purposes of colouring drawings. That of the tree in question is as good for medicinal purposes and painting as any from Siam or elsewhere, and the great probability is, that, being produced in nearly the same situations, they are identical." In another letter he says, "I think we have ascertained to a certainty that it is indigenous in Ceylon, for the largest trees are found in that part of the interior where the Dutch had no control; its favourite abode, however, seems to be, in low sandy ground, being very abundant about Kaderaane, Negombo, and towards Chilaw, also about Colombo, and not at all confined to gardens. Of all the Garcineæ which are in Ceylon, be assured that *Xanthochymus pictorius* alone is foreign. You may be equally certain that *Stalagmitis Cambogioides*, Moon's Cat., produces as fine Gamboge as any in the world, for what can be finer or more durable, than the colour on the figures of Buddhoo, painted centuries ago."

The last reference to this tree is in a note received two days ago, in which he remarks—"I have found the Stalagmitis, now described by Dr. Graham under a new name, one hundred miles inland, perfectly indigenous, and no other Garcineæ at so high an elevation, 2000 feet above the sea."

We have now irrefragable proof that the tree producing the best kind of Gamboge is a native of Ceylon. I have already proved, I think almost to demonstration, that Murray's *Stalagmitis Cambogioides* is identical with Roxburgh's *Xanthochymus Ovalifolius*, and that this new plant forms the type of a genus quite distinct from both Xanthochymus and Garcinia, for which I proposed to retain the now vacant name of Stalagmitis, combining with it *Garcinia pictoria*

Roxb. and *G. elliptica*, Wall. (fid. Graham), but which, it appears from Col. Walker's note, Dr. Graham has already published under a new name. It is now therefore certain that both Murray and Roxburgh were wrong in assigning the Pentadelphous flowered tree as the source of the true Gamboge of commerce, that Mr. Arnott and myself were equally in error in following them, and, finally, that the world is at last indebted to the industry and observation of Colonel and Mrs. Walker for making it acquainted with the characters of the long sought for genus of plants, which produces this most valuable pigment and medicine.

As a discovery so interesting cannot be too generally known, and as Colonel Walker has promised me a drawing from the accurate pencil of his accomplished lady, I trust you will be able to find room for it in a future number ; I hope, accompanied by Dr. Graham's description and name. I remain, dear Sir, Yours, &c.

Madras, 15*th April* 1837. R. W.

Errata in my former communication.

Page 304, line 19, from the bottom, for glabose read globose.
— — — 8, — — — — putoria — pictoria.

Madras, 16*th April* 1837.

My Dear Sir—I yesterday received your note, with the specimens of plants from Goomsoor which accompanied, and was sorry to find them altogether unfit for preservation. Thinking it a subject of regret, that the labour of the few persons, who in this country seem willing to devote their leisure to making us better acquainted with its vegetable productions, should be rendered fruitless for want of a little skill, easily acquired, I have drawn up the following brief and simple instructions for preserving plants (which I hope you will be able to find room for in your forthcoming number) under the conviction, that many are deterred from attempting to form collections, by not knowing how to go about it. Should you think the style I have adopted too homely, pray bear in mind that I do not write for botanists, but for the uninitiated. The instructions are nearly those I give my native collectors, who traverse every part of the country collecting for me, and have made a very large collection indeed.

Yours very truly,

To R. Cole, Esq. &c. &c. &c. Robert Wight.

Directions for preserving Plants.—The first point to be attended to in forming collection of plants is the selection of suitable specimens. These, when both are procurable, ought always to present flowers and fruit, but when both cannot be had, invariably one of them, however imperfect, as it is impossible to make out an unknown plant from the leaves only. Flower buds will generally suffice, where full blown ones are not to be had, and immature fruit, where the full grown one is either too large, or so soft and pulpy that it cannot be preserved. The smaller herbaceous plants should have root and stem; but of trees or shrubs, branches, 12 or 18 inches long, are usually sufficient. Many herbaceous plants, too large, even when folded down, to be preserved entire, have the radicle and stem leaves of different shapes; in such cases, two or three of the radicle leaves and flowering branches will form perfect specimens.

For drying, lay one or more of these specimens, according to their size, side by side, not above each other, in the fold of a sheet of paper, and subject them to considerable pressure for some hours. This is necessary to give them form, and fit them for convenient disposal in the herbarium. Where paper is abundant or readily procurable (and any kind serves for drying—common bazar paper answers the purpose perfectly), two or three sheets should be interposed between each pair of plants, to absorb as much as possible of the moisture that exudes.

When they have been thus pressed from 24 to 36 hours, the papers containing the specimens must then be removed from between the others, and either replaced between fresh dry paper, or spread out in the sun, and covered with a rather thick layer of sand, say about two inches. Two days will generally be found sufficient to dry the thin leaved plants, but if that is not enough they should be so exposed daily till thoroughly dry. Thick succulent ones often require many days. The sand serves the double purpose of preventing the leaves curling and getting out of shape, and of absorbing moisture; while it retains an equable degree of heat long after the rays of the sun have ceased to supply it. If the quantity of sand is considerable, plants may thus be even well dried, without once subjecting them to any other pressure, but as it is always very desirable to preserve the forms of plants it is better to re-press them every night when taken in. The papers that were interposed and have become damp, are in like manner to be exposed to the sun and air to dry, and fit them for re-application; by attending to this rule many thousand specimens may be dried with a few quires of paper. When dry, which is known by the stiffness of the specimens and the leaves not bending or curling on exposure to the air, they may be removed to any more convenient paper for preservation; old newspapers, especially Europe ones, are excellent; but any dry firm paper answers the purpose. My own collections, now

amounting to many thousands of specimens, are all kept in country brown paper—several specimens can thus be kept in one sheet, as they no longer spoil by being laid above each other.

For pressing specimens at home, the most simple method is to lay them between two boards, corresponding in size with the paper, under a large stone or other weight; but, in travelling, it is more convenient to bind them tightly with strong straps and buckles, or cords. For the latter purpose the boards should be made double; that is, of two thinner boards, disposed with the grain of the wood crossing at right angles, and united by a few nails round the edges. A board of this construction, half an inch thick, will resist the utmost force a man can apply in tightening the straps, and may be made up of any number of smaller pieces, in case entire ones are not procurable.

Several specimens of each plant should be taken, to guard against loss, and show variations of form which almost every plant presents, and are apt to mislead describers. Proceeding as above, any native, of ordinary intelligence, can be taught, in the course of a few days, both to collect and to dry plants, and are most valuable assistants in the formation of a herbarium; it being only necessary to give them a good bundle of paper, and send them to the jungle, with instructions to preserve specimens of every plant they can find bearing either flowers or fruit.

In collecting ferns, it is necessary to observe that the fruit are usually situated on the under surface of the leaves, forming scattered dots or lines, or covering the whole under side of the leaf or frond. Specimens of that tribe should always have fruit: but some species have fertile and sterile fronds, growing on the same root, of different forms—both should be taken.

The method of quick drying here recommended, in addition to the great saving of time and labour, possesses the further advantage of preserving the colours, better than the slower one of daily changing the wet papers, but of course does not always succeed; that, however, is a matter of inferior importance as it is by forms not colours that plants are distinguished in the herbarium. In wet or cloudy weather the daily changing process must be adopted.

To the Editor of the Madras Journal of Science and Literature.

Sir—With reference to a communication from me relative to an iron self-registering barometer, I beg to inform you that a scientific friend of mine at Ootacamund, who has evinced much interest in this matter, and who was good enough to compare and register the indications of a very rough iron one in my possession with his standard instrument, pointed out to me a few days ago in the second volume of the supplement to the Encyclopædia Britannica, a drawing of an iron barometer proposed by Blondeau.

As that instrument was of the syphon kind and was intended to act exactly like the one proposed by myself (the self-registering apparatus excepted), I hasten to assure you that I was perfectly ignorant of Blondeau's recommendation, and had previously made every inquiry in my power as to former suggestions on this head, and, from a correspondence with J. Prinsep, Esq. the Editor of the Calcutta Journal of Science, I was led to believe that iron had neither been tried or suggested, and would most probably be found defective. It does not appear that the iron barometer, alluded to in the Encyclopædia, was ever tried, and as the self-registering portion of my project has not to my knowledge been pointed out by former philosophers, I shall now state that the experiments I have made with the roughly formed instruments manufactured in Coorg, give me the most sanguine hopes of perfect success. The iron has been found to be air tight, but the following improvements to the drawings before sent seem to me essential to the perfection of the instrument.

At *a*, a small hole must be made for filling the instrument which must contain mercury sufficient to keep its surface when reversed at the dotted line *c*, to guard against the possibility of air passing up the long limb when set to work. At *b*, a mercurial tight stop cock should be placed taking care to leave ample room for the expansion of the mercury, which however even in this country need not be more than 3-10th of an inch, since about 30° of heat will increase the length of the mercurial column in this barometer only 1-10th of an inch.*

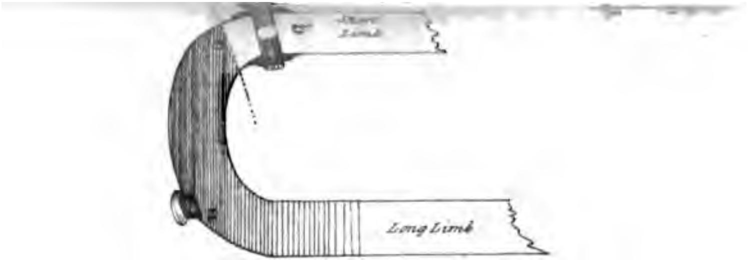
I remain, Sir,

Camp Neelgherries, *January* 2, 1837. Yours obediently,

G. Underwood, *Capt. of Engineers.*

Mr. Hodgson, of Nipal, in a letter received while the last pages of this Journal were passing through the press, requests us to alter the generic name of the Perdix described at page 303 from *Arborophila* to *Dendrophila.* This emendation, we are sorry to say, arrived too late to be introduced into the body of the work.—*Editor.*

* This letter was received when the last number of the Journal was in the press, Captain Underwood's article having been struck off. It might have been introduced in a Postscript to that number, but was overlooked, for which we beg to apologise to the Author.—*Editor.*



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	Yettoor hill..................	Manavanoor..................	33	53	62	22	15	152
		Cavunjeyoor..................	12	23	22	6	5	56
		Poondyoor..................	15	28	26	18	25	97
		Palloor..................	11	18	17	7	11	53
		Keelavauray..................	11	23	20	11	13	67
		Coomboor..................	4	6	5	3	4	18
			86	151	152	67	·73	443
		Total........	389	583	559	288	208	1638
	Shembaganoor hill..............	Shembaganoor..................	3	3	2	4	1	10
			392	586	561	292	209	1648

N. B.—The author of the Paper on the Pulney Mountains had not this table in his possession when the article went to press, or it would have been incorporated with it.—*Vide* p. 280.

J. B. Blackburne, *Principal Collector.*

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								61
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			[illegible]	[illegible]	102	106	68	505
Iyunpully	Veroopautchio hill	Paryoor	33	46	43	23	13	125
		Kunnanoor	5	8	6	1	1	16
		Vadakaudoo	7	8	7	2	1	18
		Pauvaloor	23	36	30	15	10	91
		Vennaly	1	1	1	0	0	2
			69	99	87	41	25	252
	Poombaurah hill	Cusbah Poonibarah	74	105	103	51	32	291
		Palunghee	3	4	4	2	4	14
		Palumpoottoor	3	3	2	1	0	6
		Koockaul	11	15	13	5	1	34
			91	127	122	59	37	345
	Vilputty hill	Vilputty	31	39	36	13	5	93
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N. B.—The author of the Paper on the Pulney Mountains had not this table in his possession when the article went to press, or it would have been incorporated with it.—*Vide* p. 280.

J. B. Blackburne, *Principal Collector*.

electricity; for, can it *now* be doubted, that rocks impregnated with, holding in their minute fissures different kinds of mineral waters, must be in different electrical conditions or relations to each other? A general conclusion is, that in these fissures metalliferous deposits will be determined according to their relative electrical conditions; and that the direction of those deposits must have been influenced by the direction of the magnetic meridian. Thus we find the metallic deposits in most parts of the world having a general tendency to an E. and W. or a N.E. and S. W. bearing. Mr. Fox added, that it was a curious fact, that on submitting the muriate of tin in solution to voltaic action, to the negative pole of the battery, and another to the positive, a portion of the tin was determined like the copper, the former in a metallic state, and the latter in that of an oxide, showing a remarkable analogy to the relative position of tin and copper ore with respect to each other as they are found in the mineral veins.

The Chairman (Dr. Buckland) said, it had been observed to them last evening, that the tests of some of the highest truths which philosophy had brought to light was their simplicity. He held in his hand a blacking-pot, which Mr. Fox had bought yesterday for a penny, a little water, clay, zinc, and copper; by which humble means he had imitated one of the most secret and wonderful processes of nature, her mode of making metallic veins. It was with peculiar satisfaction he contemplated the valuable results of this meeting of the Association. There was also a gentleman now at his right hand, whose name he had never heard till yesterday, a man unconnected with any Society, but possessing the true spirit of a philosopher; this gentleman had actually made no less than 24 minerals, and even crystalline quartz. He (Dr. B.) knew not *how* he had made them, but he pronounced them to be discoveries of the highest order: they were not made with a blacking-pot and clay, like Mr. Fox's, but the apparatus was equally humble; a bucket of water and a brickbat had sufficed to produce the wonderful effects which he would detail to them.

Artificial Crystals and Minerals.—A. Crosse, Esq., of Broomfield, Somerset, then came forward, and stated that he came to Bristol to be a listener only, and with no idea that he should be called upon to address a Section. He was no geologist, and but little of a mineralogist; he had however devoted much of his time to electricity, and he had latterly been occupied in improvements in the voltaic power, employing a battery which he had succeeded in keeping in full force for twelve months by water alone, rejecting acids entirely. Mr. C. then proceeded to state that he had obtained water from a finely crystallized cave at Holway, and by the action of the voltaic battery had succeeded in producing from that water in the course of ten days numerous rhomboidal

METEOROLOGICAL REGISTER KEPT AT THE MADRAS OBSERVATORY FOR THE MONTH OF FEBRUARY 1837.

Days.	Barometer at Sun rise.	10 A. M.	Noon.	2 P. M.	Sun set.	8 P. M.	10 P. M.	Thermometer at Sun rise.	10 A. M.	Noon.	2 P. M.	Sun set.	8 P. M.	10 P. M.	Rain. Sun rise.	Sun set.	Evaporation.	Direction of Wind. Morning.	Noon.	Evening.	Weather at Morning.	Noon.	Evening.
1837	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	°	°	°	°	°	°	°	Inch	Inch	Inch						
Feb. 1	29,960	30,040	30,016	29,974	29,974	29,996	30,020	66,6	78,1	79,7	80,0	75,8	74,2	74,6	... ...	... ...	1,583	N. E.	N. E.	E.	F. C.	Clear	F. C.
2	,972	,058	,0[illegible]0	,982	,964	30,000	,004	70,3	78,5	80,0	80,8	75,9	74,2	71,	... ...	... ...	... ...	E.	E.	E.	F. C.	Clear	Haze
3	,964	,048	,026	,992	,982	,012	,018	66,9	78,3	80,8	79,9	76,2	74,8	73,0	... ...	... ...	... ...	E.	E.	E.	Clear	F. C.	Clear
4	,998	,076	,050	,996	,980	29,998	,000	66,5	78,8	80,0	83,0	76,6	75,7	74,4	... ...	... ...	... ...	E.	E.	E.	Haze F.C.	Clear	F. C.
5	,988	—	29,970	,924	,890	,910	29,914	70,2	—	80,2	81,7	77,7	74,9	72,5	... ...	... ...	... ...	S. W.	E.	E.	F. C.	Clear	Clear
6	,872	29,934	,912	,876	,878	,902	,910	68,0	77,9	78,4	80,0	77,1	74,8	72,8	... ...	... ...	... ...	E.	E.	E.	Clear	Clear	Clear
7	,896	,952	,930	,896	,902	,946	,964	65,9	76,6	79,5	80,0	77,2	75,7	75,0	... ...	... ...	... ...	S. E.	E.	E.	Clear	Clear	F. C.
8	,962	30,026	,998	,960	,962	30,000	30,000	67,7	78,8	80,0	81,7	76,2	75,8	75,2	... ...	... ...	1,588	E.	E.	N. E.	Clear	Clear	Clear
9	,988	,012	30,008	,972	,964	29,976	29,974	67,2	79,9	81,3	82,0	77,2	74,9	73,0	... ...	... ...	... ...	N. E.	E.	E.	F. C.	F. C.	Clear
10	,966	,020	29,982	,954	,940	,968	,972	67,9	78,3	81,0	81,7	77,3	76,0	75,5	... ...	... ...	... ...	E.	E.	E.	Clear	Clear	Clear
11	,930	29,988	,940	,880	,862	,9[illegible]2	,910	67,9	79,0	81,9	78,5	78,3	76,1	75,2	... ...	... ...	... ...	E.	E.	S. E.	Clear	Clear	Clear
12	,878	,986	,872	,816	,800	,820	,830	73,0	80,0	83,5	87,0	78,9	77,9	77,5	... ...	... ...	... ...	S. E.	E.	S.	Haze	Clear	Clear
13	,874	,954	,928	,882	,882	,918	,936	74,4	81,2	84,0	84,2	80,3	79,9	79,8	... ...	... ...	... ...	S.	S.	S. E.	F. C.	Clear	Clear
14	,948	30,027	30,000	,954	,902	30,002	,990	73,9	83,9	85,0	85,[illegible]	80,2	78,2	78,0	... ...	... ...	... ...	S. E.	S. E.	S. E.	F. C.	Clear	Clear
15	,990	,062	,040	,990	,972	,002	30,010	71,9	82,0	83,0	83,8	79,8	77,3	77,0	... ...	... ...	1,773	S. F.	S. E.	E. by S. E.	F. C.	Clear	Clear
16	,974	,040	,010	,956	,956	29,994	—	72,0	80,6	82,7	84,3	78,3	77,2	—	... ...	... ...	... ...	S. E.	S. E.	S. E.	F. C.	Clear	Clear
17	,996	,061	,044	30,000	,998	30,042	30,046	70,3	80,4	82,6	82,3	78,3	77,1	76,3	... ...	... ...	... ...	E.	S. E.	S. E.	F. C.	F. C.	Clear
18	30,036	,092	,061	,020	30,002	,030	,020	69,7	80,2	81,5	81,9	77,8	76,2	76,0	... ...	... ...	... ...	S. E.	E.	S. E.	F. C.	F. C.	Clear
19	,008	—	,026	29,982	29,932	29,984	29,994	68,1	—	81,0	82,1	78,2	76,0	74,4	... ...	... ...	... ...	E.	E.	E.	Clear	Clear	Clear
20	29,996	30,050	,022	,974	,962	,996	—	66,4	79,8	82,1	83,4	78,2	75,8	—	... ...	... ...	... ...	E.	E.	E.	Clear	Clear	Clear
21	30,014	,076	,062	30,016	—	—	—	68,5	80,4	81,9	83,2	—	—	—	... ...	... ...	... ...	E.	N. E.	—	F. C.	F. C.	—
22	,020	,096	,070	,030	30,030	30,050	—	70,2	81,7	82,0	83,4	78,5	77,1	—	... ...	... ...	1,827	E.	N. E.	N. E.	Clear	F. C.	Clear
23	,018	,056	,028	29,988	29,972	29,996	—	72,0	81,8	83,8	83,6	78,5	77,8	—	... ...	... ...	... ...	N. E.	N. E.	N. E.	F. C.	F. C.	Th. haze
24	29,978	,034	,002	,956	,944	,956	—	71,4	79,9	82,0	83,6	78,4	77,7	—	... ...	... ...	... ...	N. E.	N. E.	N. E.	F. C.	Clear	F. C.
25	,960	29,996	29,978	,932	,922	,938	—	70,5	81,3	83,7	83,9	78,3	76,2	—	... ...	... ...	... ...	N. E.	N. E.	N. E.	Haze	Clear	Haze
26	,920	—	,932	,890	—	—	—	69,8	—	83,3	83,4	—	—	—	... ...	... ...	... ...	E.	—	—	F. C.	Clear	—
27	,878	29,954	,928	,882	—	—	—	70,1	79,8	82,3	83,7	—	—	—	... ...	... ...	... ...	E.	S. E.	—	F. C.	Clear	—
28	,890	,916	,956	,910	—	—	—	70,2	80,6	81,5	85,[illegible]	—	—	—	... ...	... ...	... ...	S.	S.	S.	Th. haze	—	Haze
Mean	29,960	30,023	29,994	29,949	29,940	29,972	29,973	69,6	79,9	81,7	82,6	77,9	76,3	75,1									

METEOROLOGICAL REGISTER KEPT AT THE MADRAS OBSERVATORY FOR THE MONTH OF MARCH 1837.

Days.	Barometer at Sun rise.	Barometer at 10 A. M.	Barometer at Noon.	Barometer at 2 P. M.	Barometer at Sun set.	Barometer at 8 P. M.	Barometer at 10 P. M.	Thermometer at Sun rise.	Thermometer at 10 A. M.	Thermometer at Noon.	Thermometer at 2 P. M.	Thermometer at Sun set.	Thermometer at 8 P. M.	Thermometer at 10 P. M.	Rain. Sun rise.	Rain. Sun set.	Evaporation.	Direction of Wind. Morning.	Direction of Wind. Noon.	Direction of Wind. Evening.	Weather at Morning.	Weather at Noon.	Weather at Evening.	Remarks.
1837	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	o	o	o	o	o	o	o	Inch	Inch	Inch							
Mar. 1	29,920	30,004	29,970	29,946	29,932	29,970	—	69,7	81,5	83,5	84,5	80,9	78,3	—	... ...	... ...	1,804	S W	S E	S E	Clear	Clear	Clear	Dew
2	,960	,010	,966	,926	,912	,928	—	71,9	82,4	84,2	86,0	80,2	78,2	—	... ...	... ...	... ...	S W	S E	E	F C	Clear	Clear	Dew
3	,918	29,984	,956	,882	,886	,932	—	70,9	82,1	83,6	85,0	80,3	78,4	—	... ...	... ...	... ...	N	S E	S E	F C	F C	Clear	—
4	,936	30,008	,986	,950	,924	,958	29,976	69,9	83,1	84,2	85,7	81,4	79,0	78,8	... ...	... ...	... ...	S E	S	S E	Clear	Clear	Clear	Dew
5	,976	—	,998	,966	,950	,982	,996	71,8	—	84,9	86,3	82,2	79,8	76,2	... ...	... ...	... ...	W	S E	S E	F C	F C	Clear	Dew
6	,976	30,042	30,018	,976	—	—	,992	72,0	82,4	82,1	84,2	—	—	76,0	... ...	... ...	... ...	W	S E	S E	F C	Clear	Clear	Dew
7	,954	,030	,002	,964	—	—	30,100	71,7	82,3	83,0	84,6	—	—	76,0	... ...	... ...	... ...	W	S E	S E	Clear	Clear	Clear	Dew
8	,966	,031	,010	,978	—	—	29,984	69,8	82,2	84,0	85,5	—	—	77,9	... ...	... ...	2,244	W	S E	S E	F C	Clear	Clear	Dew
9	,964	,044	,024	,982	29,958	29,998	30,004	69,9	82,9	84,0	86,2	82,0	78,4	77,5	... ...	... ...	... ...	W	S	S F	Clear	Clear	Clear	Dew
10	,986	,022	29,998	,951	,922	,946	29,950	70,2	82,3	84,2	84,5	82,3	78,8	78,0	... ...	... ...	... ...	S W	S E	E	F C	Clear	Clear	Dew
11	,982	29,958	,922	,872	,876	,990	,908	75,0	83,1	85,3	84,8	81,9	80,3	79,9	... ...	... ...	... ...	N E	S E	S E	F C	Clear	Clear	Dew
12	,913	—	,942	,908	,900	,936	,956	74,3	—	85,6	89,4	82,4	80,0	79,7	... ...	... ...	... ...	S W	W	S E	F C	Clear	Clear	Dew
13	,976	30,028	,982	,934	,924	,938	,946	75,2	83,4	85,0	85,5	80,5	80,0	78,8	... ...	... ...	... ...	W	S E	E	F C	F C	Haze	Dew
14	,874	29,924	,874	,840	,824	,854	,866	76,2	84,2	85,8	87,0	82,0	80,2	79,5	... ...	... ...	... ...	W	N	S E	F C	Clear	Clear	Dew
15	,818	,884	,846	,808	,804	,834	,854	75,7	85,2	86,8	86,8	82,1	79,9	78,2	... ...	... ...	4,068	W	E	S F	F C	Clear	Clear	Dew
16	,822	,906	,874	,838	,844	,872	,894	73,2	84,7	85,6	86,0	81,9	79,8	78,8	... ...	... ...	... ...	S	E	S E	Clear	Clear	Clear	Dew
17	,890	,962	,938	,882	,870	,908	,924	71,9	84,1	84,9	85,6	81,7	80,0	80,0	... ...	... ...	... ...	W	E	S E	Clear	Clear	Clear	Dew
18	,916	,998	,975	,934	,904	,922	,952	72,8	84,2	84,9	85,6	82,3	79,7	77,6	... ...	... ...	... ...	W	E	S	F C	Clear	Clear	Dew
19	,914	—	,924	—	,854	,876	,880	72,5	—	87,9	—	84,4	82,1	79,5	... ...	... ...	... ...	S W	S E	E	Clear	Clear	Clear	Dew
20	,854	29,914	,896	29,850	,840	,862	,876	74,5	86,4	87,8	91,3	83,4	81,1	78,8	... ...	... ...	... ...	S W	S E	S	Clear	Clear	Clear	Dew
21	,822	,896	,872	,816	,830	,842	,856	74,3	85,8	86,7	86,3	82,4	80,6	78,3	... ...	... ...	... ...	S	S E	S	F C	Clear	Clear	Dew
22	,776	,836	,816	,770	,774	,820	,856	74,2	84,9	85,7	83,8	82,7	80,3	79,7	... ...	... ...	4,478	S W	S E	S	Clear	Haze	Clear	Dew
23	,830	,908	,870	,842	,838	,852	—	74,6	86,6	86,5	88,1	80,3	81,0	—	... ...	... ...	... ...	S W	S E	S E	F C	Clear	Clear	Dew
24	,902	,954	,934	,882	,856	,880	29,902	76,2	82,6	84,2	84,5	82,2	81,3	80,2	... ...	... ...	... ...	W	S	S E	F C	Clear	Clear	Dew
25	,874	,922	,884	,854	,846	,864	—	73,9	82,9	83,7	84,0	81,9	79,9	—	... ...	... ...	... ...	S W	S	—	Clear	Haze	F. C.	Dew
26	,880	—	,910	—	,838	,872	—	76,2	—	84,0	—	82,7	81,8	—	... ...	... ...	... ...	W	S	S E	Haze	Th Haze	Th. haze	Dew
27	,878	,942	,914	29,864	,834	,850	29,896	75,8	82,5	84,6	85,0	83,3	82,2	82,0	... ...	... ...	... ...	S W	S E	S E	F C	Clear	Clear	Dew
28	,812	,904	,864	,808	,776	,800	—	78,7	84,0	85,1	85,8	84,0	82,9	—	... ...	... ...	... ...	W	S E	S	F C	Clear	Haze	Dew
29	,781	,834	,792	,744	—	—	—	79,7	84,2	86,8	86,6	—	—	—	... ...	... ...	... ...	S	S E	—	Haze	Clear	—	Dew
30	,762	,808	,776	,728	—	—	—	80,2	84,9	87,0	86,3	—	—	—	... ...	... ...	... ...	S	S E	—	Haze	Clear	—	} Light-
31	,786	,862	,824	,768	29,752	29,782	—	80,0	84,7	86,0	86,4	84,8	84,1	—	... ...	... ...	... ...	S	S E	S E by S	F C	Clear	Clear	ning
Mean	29,890	29,948	29,921	29,878	29,864	29,895	29,927	74,0	83,7	85,1	85,9	82,8	80,3	78,6										

The instruments with which the foregoing observations have been made, are placed upon a table about 4 feet above the ground in the western verandah of the Honorable Company's Observatory; which is situated in the longitude of 5h. 21m. 9s. E. and latitude 13° 4′ 9″ N. at about 2 miles from the sea and about 27 feet above the low water mark.

The Barometrical indications are derived from a Standard of my own construction, and require a correction + ,125 inches in addition to that due to temperature. The Thermometrical Observations are, I believe correct, the Thermometer having been found to agree with Troughton's Standard.

T. G. TAYLOR,

1st April, 1837. *H. C.'s Astronomer.*

THE
MADRAS JOURNAL
OF
LITERATURE AND SCIENCE,

PUBLISHED UNDER THE AUSPICES

OF THE

MADRAS LITERARY SOCIETY

AND

AUXILIARY OF THE ROYAL ASIATIC SOCIETY.

VOL. VI.